



# MPC-ML2DVR

Programmable  
Digital Video Recorder  
LCD Monitor



## User Manual

[www.MarinePC.com](http://www.MarinePC.com)

# Owner Record

Here is an easy-to-locate form to record the unit’s serial number, and from the invoice, record the invoice date. The unit’s serial number is located on the back panel.

If the unit ever requires service, please refer to this information when contacting the MarinePC Service Center.

| Product      | Serial Number                                                      | Invoice Date                                                         |
|--------------|--------------------------------------------------------------------|----------------------------------------------------------------------|
| MPC-ML2--DVR | <div><div></div><div></div><div></div><div></div><div></div></div> | <div><div></div><div>/</div><div></div><div>/</div><div></div></div> |

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# **MPC-ML2--DVR**

**Military Grade  
Programmable  
Digital Video Recorder  
LCD Monitor  
8.4", 10.4", 12.1", 15"**



**User Manual**

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# Welcome.

With the acquisition of an All-Weather Digital Video Recorder/Monitor, MPC-ML2DVR, we welcome you to MarinePC's family of ruggedized professional marine grade products.

You will soon become familiar with the quality difference in this bright sunlight-readable (~1 nit to 1,000 nits) Monitor, specifically designed to meet or exceed MIL-Specs for use in harsh marine environments. MarinePC has incorporated the latest LED backlighting to increase brightness and super-low dimming without increased heat, and extends temperature, shock and vibration specifications.

The MPC-ML2DVR also integrates full DVR capability directly inside the case of the waterproof monitor, eliminating separate mounting interconnecting cables, saving space and providing environmental protection and transportability for the DVR.

In addition, this new release, Series 2, incorporates user programmable function buttons conveniently mounted on the bezel to provide customizable multiple functionality in one ruggedized station.

The MPC-ML2DVR handles a wide-range of severe environments, making it the first choice of serious mariners for their demanding applications. Designed to be rugged, the 800x600 (SVGA) Resolution Flat Panel Display is engineered to mate perfectly to all leading edge cameras including infrared, image amplified and visible spectrum sources.

Housed in a milled billet aluminum case, the slim-profile MPC-ML2DVR is light weight and watertight, with fully sealed (IP67) case and standard MIL-C-38999 connectors. Engineered to be energy efficient to conserve power, the MPC-ML2DVR has three Composite Video inputs, with a source select button that lets you easily move between up to three inputs, and also provides one video output. Recorded files can be easily downloaded in standard .wmv file format via a USB connection.

Our MarinePC Service and Support Team is prepared to assist you - we are MarinePC.

# GENERAL SAFETY

## Safety Icons

Safety icons are displayed throughout the User Manual to draw attention to specific User Caution and Warning Instructions.



**WARNING!**

### WARNING! SHOCK HAZARDS

This icon is intended to tell the User of a potential risk of electrical shock.



**CAUTION!**

### CAUTION! INSTRUCTIONAL

This icon is intended to tell the User of important operating and/or maintenance instructions.

## General Safety Instructions

- Before operating the MPC-ML2DVR Display, read this User Manual thoroughly
- Keep this User Manual for future use
- Verify the system capability (see System Setup) to ensure operation of the Display
- For expeditious installation, follow these User Manual instructions in sequence
- Adhere to all Caution and Warnings on system and as stated in this User Manual
- User Manual instructions for installation and operation should be followed precisely
- Adjust only those controls covered by this User Manual's instructions; improper adjustment of other controls voids Display's warranty and may result in Display damage, and
- Adhere to local installation codes.

## General DISPLAY Safety

- Always disconnect Display from power source before cleaning
- Do not operate Display with a damaged cable, and
- Do not operate if Display has been dropped or damaged. Unit should be inspected by qualified MarinePC Service Personnel.



**WARNING!**

### GENERAL SAFETY PRECAUTIONS

- Power cable must be connected to a properly wired and grounded power source
- Any system to which the Display is attached must also be connected to properly wired and grounded power sources
- Do not connect or disconnect Display during an electrical storm
- Do not open Display enclosure – there are no User serviceable parts
- Do not disassemble or modify Display to avoid possibility of electrical shock, damage to electrical components or scratching the Display surface, and
- Disassembly of Display voids warranty.

# LCD AND ELECTRICAL SAFETY

## LCD Display Safety

It is recommended Users adhere to personal safety in the instance the DVR display screen should be shattered. Aside from obvious glass shards, the fluids in the LCD are a known skin irritant.



CAUTION!

### FLUIDS FROM LCD DISPLAY

- If Display should become shattered, do not touch fluids from LCD Screen
- If fluid should get on hands or clothing, immediately wipe off with liquid soap or rubbing alcohol on a clean towel; wash with water; immediately consult with a doctor, and
- If fluid gets in the eyes, flush eyes immediately with water for a minimum of 15 minutes; immediately consult with a doctor.

## Electrical



CAUTION!

### EMI/RFI

Product has been engineered to meet or exceed international industry standards addressing product design and enclosure protection against EMI/RFI.

## Connecting Cables

- Disconnect power to system when Display is being installed
- Upon installation, verify power input connector is securely seated on Display
- Position power cable so it is not in contact with hot surfaces
- Do not allow anything to rest on power cable, and
- Protect power cable from extreme heat sources.

## Power Source

- Always connect to a properly grounded DC (standard) power source
- Unit may be powered with a qualified AC/DC Adapter (ask factory for details)
- Any equipment to which Display is attached must also be connected to properly wired and grounded power sources
- Operational voltage is 10 - 36 VDC (Input is 12, 24, 28 VDC nominal), and
- Power Consumption is: 30 Watts maximum.



WARNING!

### POWER CONSUMPTION

MPC-ML2DVR power consumption is listed at 30 Watts maximum.

# PRODUCT CARE

## Product Care

This DVR Display has been designed to provide optimum performance and service without any required scheduled maintenance other than occasional cleaning.



Disconnect Display from power source before cleaning Display, optional Touch Screen or Display's enclosure.



- Do not use abrasive or solvent-based (flammable) cleaners on Display enclosure or any other electrical device (cables, power cable, etc.)
- Do not use paper products as they may scratch Display screen, and
- Do not directly apply cleaning solutions to Display screen.

## Display Screen Cleaning

- A vinegar-based cleaner is preferred: prevents streaking, degradation of coatings
- A nonabrasive glass cleaner may be used, as in professional foam glass cleaner
- Apply cleaning solution to a soft clean cloth, dampening slightly
- Keep a fresh side of cleaning cloth towards screen surface to avoid scratching it with accumulated grit as Display screen is made of glass, and
- To minimize risk of abrasion to glass screen, air drying is recommended.

## Display Enclosure

- Clean Display enclosure with soft clean cloth lightly dampened with a mild detergent solution
- Wipe down with clean water; dry with a soft clean cloth.



*In marine or similar environments, a benefit of a vinegar-based cleaner is its effectiveness in dissolving mineral and salt deposits.*

## Long-term Storage

- For long-term storage, it is suggested Display be stored in a normal indoor environment and Display glass be protected from accidental damage
- For pedestal mount units, disconnect cable(s) and loosen arm adjustment to a point where ball can be removed from arm, or
- For Flush or Panel Mount units, cover product with a protective covering that will not scratch or transfer any dyes to Display screen.



Disassembling Display voids warranty. To avoid risk of electrical shock, do not disassemble enclosure; Users cannot service. User maintenance is restricted to cleaning or power cable replacement, as explained.

# MAINTENANCE

## Maintenance

### Other Maintenance

Only MarinePC Qualified Service Personnel should perform all other maintenance except for cleaning and power cable replacement as described.



WARNING!

#### POWER CABLE

To avoid shock and fire hazards, replaced Display's power cable if:

- Insulation becomes damaged, or
- A loose connection is suspected.

## Protection on Servicing

### Servicing - User

- User Servicing is limited to cleaning the Display
- Do not disassemble or modify the Display to avoid the possibility of electrical shock, damage to its electrical components or scratching the Display surface, and
- Disassembly voids the warranty.

### Servicing - DSE

MarinePC Qualified Service Personnel may be required to service the Display if:

- Does not operate normally when installation instructions are followed
- Does not operate normally when operating instructions are followed
- Has been dropped or damaged, or
- Exhibits a distinct change in performance, indicating a need for service.

## Shipping

If Display should need to be shipped to the MarinePC Service Center, the original packing material should be used to ensure safety of Display in shipping. Repack Display as it would have originally been received from manufacturer.

### Shipping Box Contents

The DVR is shipped in a custom box with enhanced packaging. Installer should save box and all packaging materials in the instance Display is returned to the MarinePC Service Center.

Shipping box contents are:

- MPC-ML2DVR Display
- Cables and RAM Arm Mounting, if Ordered

# SYSTEM SETUP

The DVR accepts Composite Video signals; (4) RS170 Inputs; (1) RS170 Output.

# INSTALLATION

The DVR can be installed with: Front Mount (M4), Panel Mount (M4); RAM Mount (M4), Side Mount (M4), or VESA Mount (75mm / M4). Follow known-good practices during installation.

# DISPLAY CONNECTORS

## Cables

With a wide range of system installations requiring varying cable lengths, the DVR does not ship with cables. Special-order cables are available; otherwise, all cables are supplied by the end user.



Use caution when coupling or uncoupling cables and connectors.

## Connectors

Connectors are located on the back of the DVR chassis. See Figure 1, Table 1 for Connector Assignments.

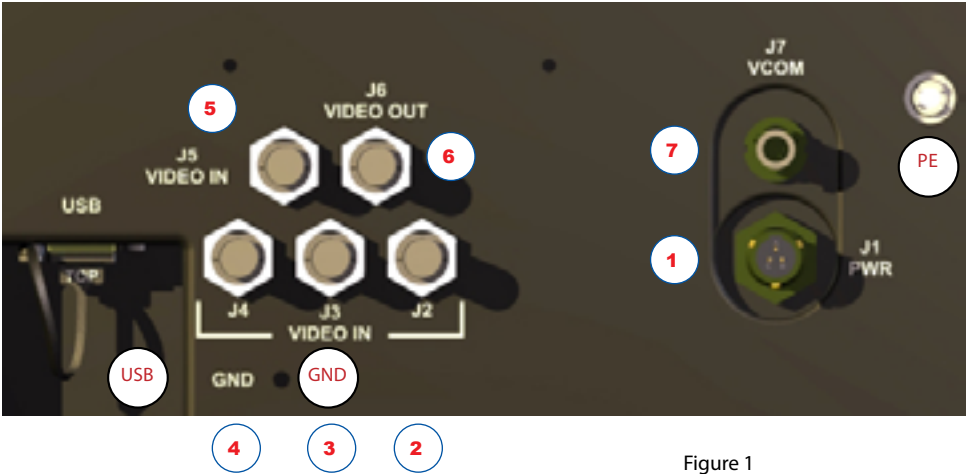


Figure 1

| POSITION | CONNECTOR    | CALL - OUT |
|----------|--------------|------------|
| 1        | POWER        | J1         |
| 2        | VIDEO IN     | J2         |
| 3        | VIDEO IN     | J3         |
| 4        | VIDEO IN     | J4         |
| 5        | VIDEO IN     | J5         |
| 6        | VIDEO OUT    | J6         |
| 7        | VCOM         | J7         |
| PE       | PRESSURE EQ. | N/A        |
| USB      | USB          | USB        |

Table 1

# DISPLAY CONNECTORS (CONTINUED)

## Power Connector (J1)

The military grade sealed Power Connector is J1. See Table 2.

- Align up with J1 connector; See Figure 1, #1
- Add a twist to lock
- End-user supplies cable

## POWER CONNECTOR

| J1 PWR |                |
|--------|----------------|
| PIN    | SIGNAL         |
| A      | 28 VOLT DC     |
| B      | 28 VOLT RTN    |
| C      | CHASSIS GROUND |
| AMPH   | 71-533721-33P  |
| MATE   | PT06E-833SSR   |

Table 2

## Composite - VIDEO IN (J2 - J5)

The center pin BNC Connectors - VIDEO IN (J2-J5) allow input of auxiliary composite video signals (RS170). See Table 3.

- Align with J2-5, VIDEO IN connector; See Figure 1: #2 (J2), 3 (J3), 4 (J4), 5 (J5)
- Add a twist to lock
- BNC receptacle is sealed
- End-user supplies cables

## BNC CONNECTOR - IN

| J2 - J5 |        |
|---------|--------|
| PIN     | SIGNAL |
| 1       | VID_IN |
| 2       | GROUND |

Table 3

## Composite - VIDEO OUT (J6)

The center pin BNC Connector - VIDEO OUT (J6) provides pass-through of composite video signal. See Table 4.

- Align with J6, VIDEO OUT connector; See Figure 1, #6 (J6)
- Add a twist to lock
- BNC receptacle is sealed
- End-user supplies cable

## BNC CONNECTOR - OUT

| J6     |         |
|--------|---------|
| PIN    | SIGNAL  |
| CENTER | VID_OUT |

Table 4

# DISPLAY CONNECTORS (CONTINUED)

## VCOM (J7)

The VCOM (J7) connector allows for communications with external device. See Table 5. External communication is only active when Video Input 1 (J2) is displayed.

- Align with J7 - VCOM connector; See Figure 1, #7 (J7)
- End-user supplies cable

| VCOM |                   |
|------|-------------------|
| J7   |                   |
| PIN  | SIGNAL            |
| 1    | RS422 TX+ COM     |
| 2    | RS232 TXD COM     |
| 3    | RS232 RXD COM     |
| 4    | DIGITAL GND       |
| 5    | RS422 RX+ COM     |
| 6    | RS422 TX- COM     |
| 7    | RS422 RX- COM     |
| AMPH | 803-015-07ZN6-7PN |
| MATE | 803-001-06ZN6-7SN |

Table 5

## USB-A CONNECTOR (USB)

The USB-A Connector (USB) provides the link to download saved mp4 and jpg files from the Media Library. See Table 6.

- Align with USB connector; See Figure 1, USB
- End-user supplies cable

| USB-A CONNECTOR |                |
|-----------------|----------------|
| USB-A           |                |
| PIN             | SIGNAL         |
| 1               | N/C            |
| 2               | DATA -         |
| 3               | DATA +         |
| 4               | GND            |
| AMPH            | P-MUSB-A511-00 |

Table 6

## Pressure Equalizer Valve

There is a Pressure Equalizer Valve on the chassis, see Figure 1, PE. See Figure 2 for close-up. In final installation, do not block or constrain valve.



Figure 2



### CAUTION!

CAUTION!

Do not block or constrain the Pressure Equalizer Valve.

# DIGITAL VIDEO RECORDER (DVR)

## DIGITAL VIDEO RECORDER (DVR)

A fundamental characteristic of the DVR is as an integrated Display/Digital Video Recorder. The DVR provides real-time recording of high frame-rate (30 fps) 24-bit hi-resolution imagery. Video files are compressed in the industry-standard MPEG-4 file format (mp4). Snapshots (jpg) can be made. Video and Snapshot files are stored in the Media Gallery (Media Menu, Figure 10).

The DVR stops recording when the user is in the Media Menu (Figure 10).

**MEDIA FILE NAMES.** Video or snapshot File names reference Military naming format: YY-MM-DD\_HR\_MN\_SEC. Example: January 15, 2015, 18:15.47 is read as 15-01-15\_18-15-47.mp4. File names are readable when Display is connected to a PC and viewed as a remote disk drive. When the USB is connected Windows will recognize the display as a storage device. However, the DVR must be in download mode first.

**MEDIA FILE STORAGE CAPACITY.** Total Media File Storage Capacity is based on the memory GB installed in the PSM: 32GB is standard; 64GB is optional. Memory is not field-upgradeable or field-replaceable. If the display's memory capacity is unknown, this can be determined when the display is connected to a PC for Media Library PC download (Figure 12).

**Recording Space Indicator.** In many menu screens, in upper left corner of screen is a bar indicator depicting available DVR recording space. This yellow bar decreases as DVR storage space is used. (Figure 3).

When 10 minutes of storage remains, the Recording message box adds the countdown of minutes, from 10 to 0.



Figure 3. Bar Indicator;  
25% used

The Bar Indicator disappears when the user is in the Media Menu (Figure 10) since the DVR stops recording in that menu.

**VIDEO RECORDING TIME.** For full motion, full color feed, recording time is approximately 1GB/hour.

Black and white feed (i.e. Infrared (IR) Camera) and/or lesser bandwidth signals should result in media storage using less than 1GB/hour.

**DVR Operating Modes.** The DVR has two operating modes: Standard (as in Live Video Feed) and Playback, through Media Gallery viewing. See section Media Menu, Figure 10.

*This section is intentionally left blank.*

# POWER ON VIEW

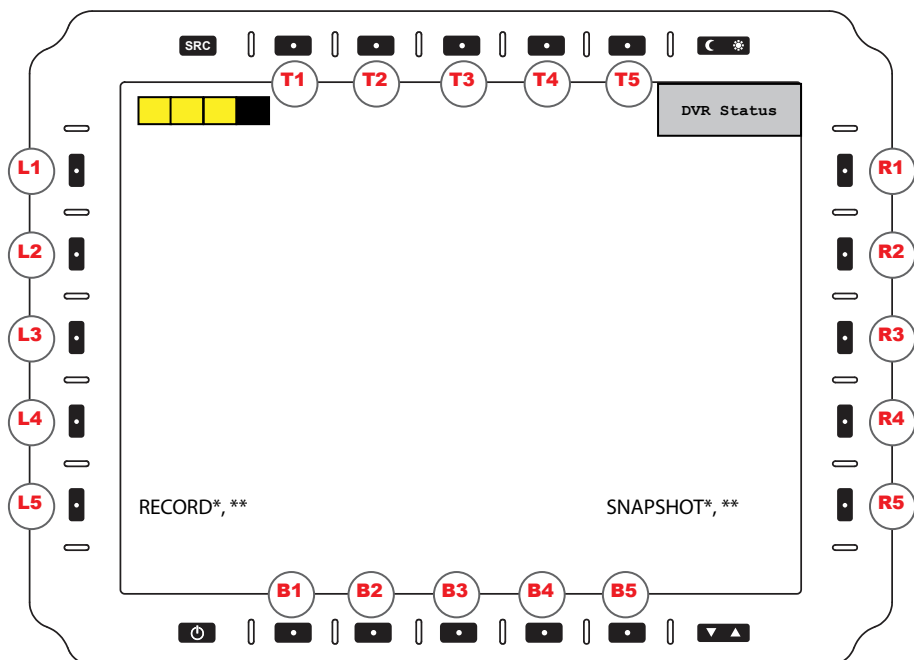


Figure 4

## POWER ON VIEW

The front bezel twenty (20) softkeys are in a layout of five keys on the left (L1-5), right (R1-5), bottom (B1-5) and top, (T1-5) (Figure 4). Use these keys to select on-screen menu options. The keys are illuminated in Day or Night mode and off in OFF mode. Night luminance is subdued to match existing platform night lighting. At Power ON, the above view is on the display screen. Note: RECORD and SNAPSHOT keys are preset yet can be moved to other programmable keys.

**MEMORY STATUS.** Available recording memory displays in top left.

**DVR STATUS.** Initializing, DVR Error or Recording Status displays in top right.

**RECORD\* (L5).** Starts recording of selected channel input and opens Record Menu. Videos/Images are saved with the current Time/Date stamp.

- **Single Source Layout.** Recording Starts/Stops with key press.
- **PIP Layout.** Record source saved in PIP view is default for recording; PIP Record Menu opens (Figure 5). Saves to Media Library (Media Menu, Figure 10).
- **POP Layout.** Record source saved in POP view is default for recording; POP Record Menu opens (Figure 6). Saves to Media Library (Media Menu, Figure 10).
- **QUAD Layout.** Record source saved in QUAD view is default for recording; QUAD Record Menu opens (Figure 7). Saves to Media Library (Media Menu, Figure 10).

**SNAPSHOT\*\* (R5).** Takes a Snapshot (jpg) of source image in view. Opens up the Snapshot Viewer Menu (Figure 15). Snapshot saved to Media Library (Media Menu, Figure 10).

# PIP RECORD MENU VIEW

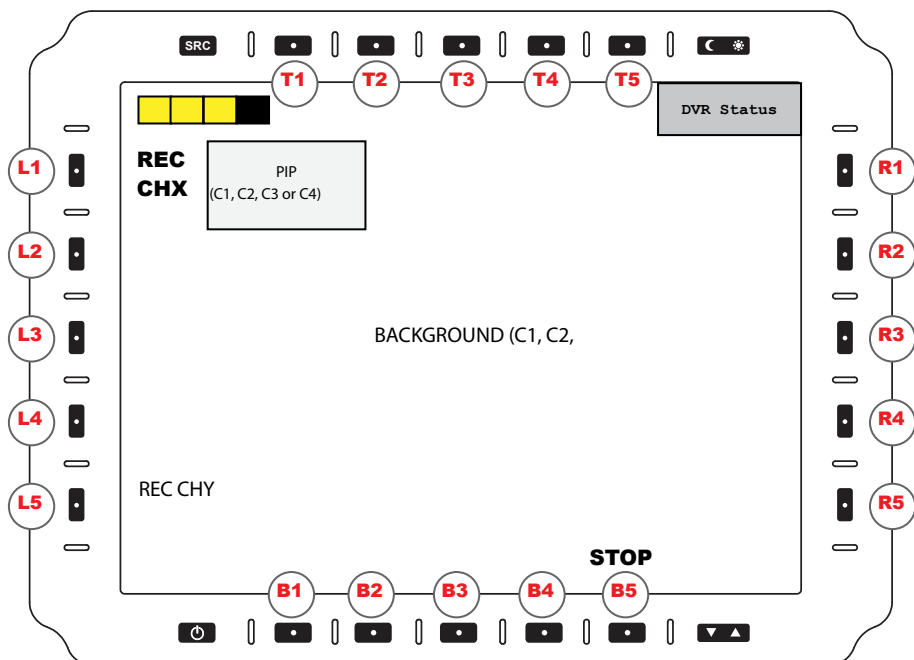


Figure 5

## PIP RECORD MENU VIEW

A border is drawn around the feed that will be recorded. Only one video source can be recorded at a time. Videos/Images are saved with the current Time/Date stamp.

Recording all frames within PIP view is not available.

**MEMORY STATUS.** Available memory for recording displays in top left.

**DVR STATUS.** Initializing, DVR Error or Recording Status displays in top right.

**REC CHX (L1).** Sets CHX (C1 - C4) as record path video source and closes Record Menu. CHX will display as C1, C2, C3 or C4 to match the current PIP source.

**REC CHY (L5).** Sets CHY (C1 - C4) as record path video source and closes Record Menu. CHY will display as C1, C2, C3 or C4 to match the current background (feed) source.

**STOP (B5).** Stops recording and closes Record Menu; returns to previous screen.

# POP RECORD MENU VIEW

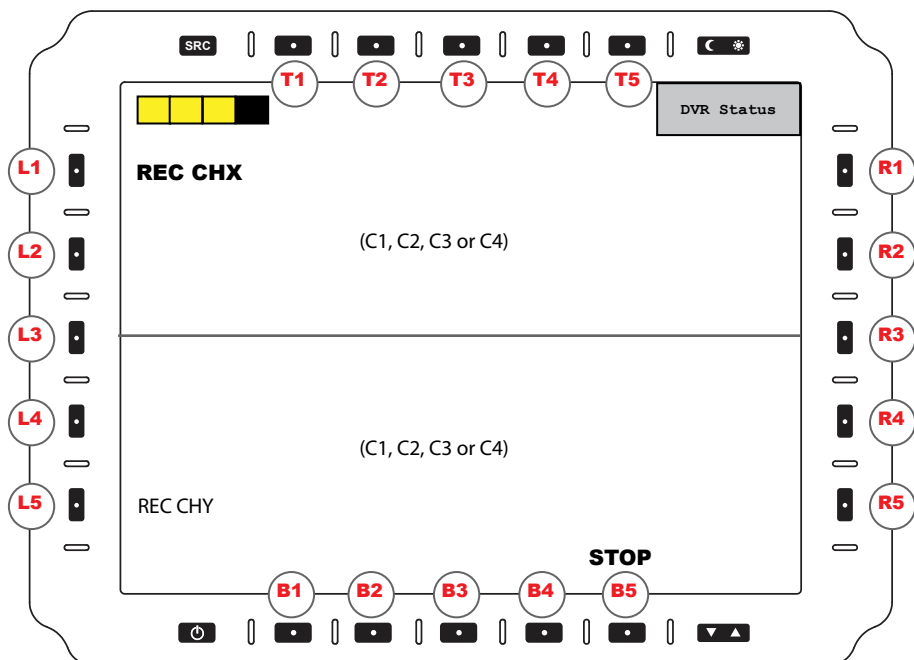


Figure 6

## POP RECORD MENU VIEW

A border is drawn around the feed that will be recorded. Only one video source can be recorded at a time. Videos/Images are saved with the current Time/Date stamp.

Recording all frames within POP view is not available.

**MEMORY STATUS.** Available memory for recording displays in top left.

**DVR STATUS.** Initializing, DVR Error or Recording Status displays in top right.

**REC CHX (L1).** Sets CHX (C1 - C4) as record path video source and closes Record Menu. CHX will display as C1, C2, C3 or C4 to match the top POP source.

**REC CHY (L5).** Sets CHY (C1 - C4) as record path video source and closes Record Menu. CHY will display as C1, C2, C3 or C4 to match the bottom POP source.

**STOP (B5).** Stops recording and closes Record Menu; returns to previous screen.

# QUAD RECORD MENU VIEW

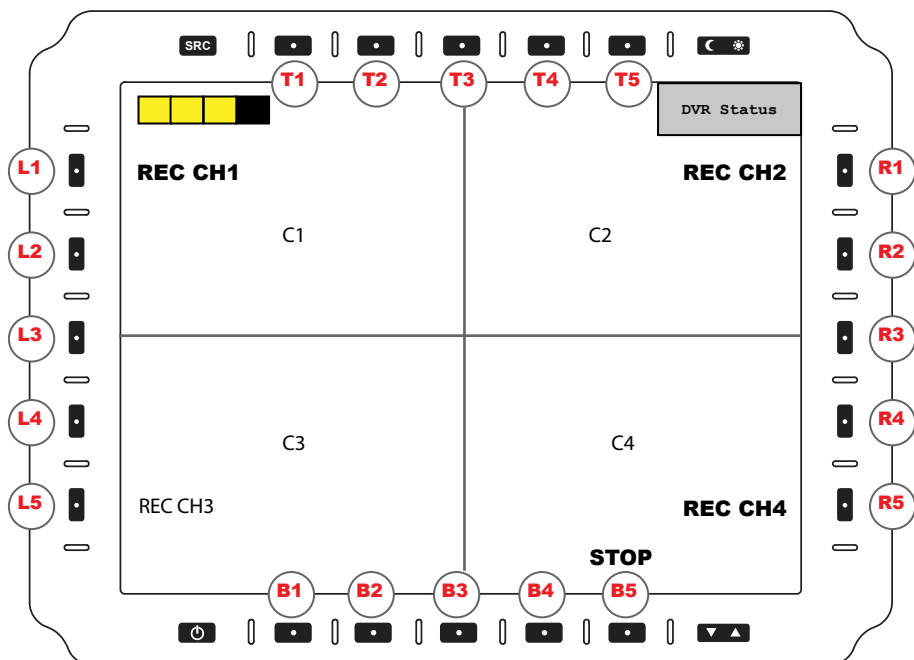


Figure 7

## QUAD RECORD MENU VIEW

A border is drawn around the feed that will be recorded. Only one video source can be recorded at a time. Videos/Images are saved with the current Time/Date stamp.

Recording all frames within QUAD view is not available.

**MEMORY STATUS.** Available memory for recording displays in top left.

**DVR STATUS.** Initializing, DVR Error or Recording Status displays in top right.

**REC CH1 (L1).** Sets CH1 as record path video source and closes Record Menu.

**REC CH2 (R1).** Sets CH2 as record path video source and closes Record Menu.

**REC CH3 (L5).** Sets CH3 as record path video source and closes Record Menu.

**REC CH4 (R5).** Sets CH4 as record path video source and closes Record Menu.

**STOP (B5).** Stops recording and closes Record Menu; returns to previous screen.

# MAIN MENU

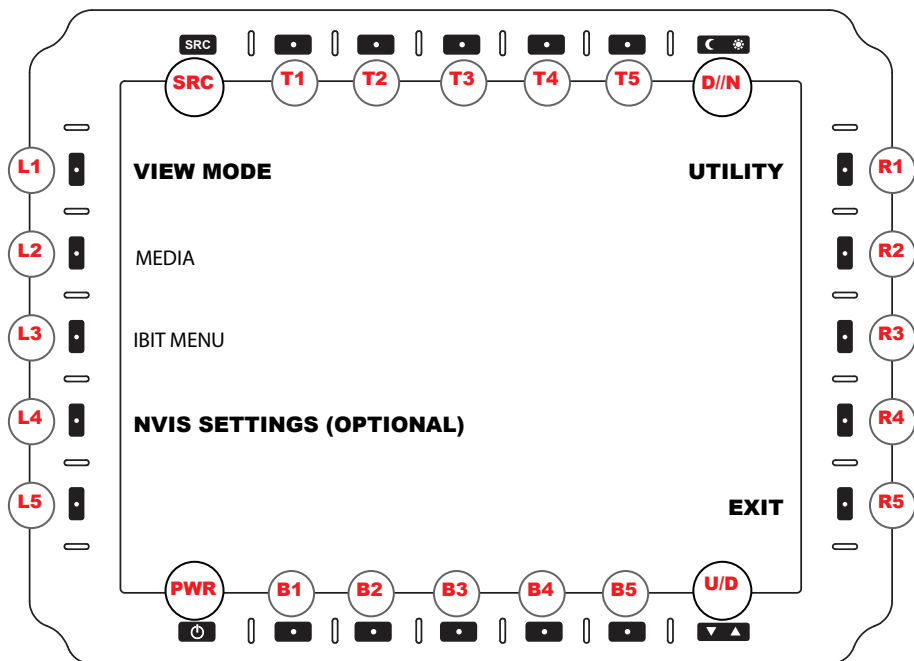


Figure 8

## MAIN MENU ACCESS

Several User Menus are factory-set in the PSM. To access the Main Menu (Figure 8) which allows access to PSM's submenus, hold down the SOURCE key for three (3) seconds (top row, far left).

**SRC**

The SOURCE Key (SRC) is located on the top row of softkeys, first key on the left, as indicated in Figure 8. Other softkeys are explained in other sections of this User Manual.

## Main Menu

The Main Menu is the user's entry portal to submenus. From this top level, the following submenus are accessed, which open additional tiers of extended submenus. To access the Main Menu, hold down the Source Key (SRC) for three (3) seconds.

- **VIEW MODE (L1).** Enter View Mode submenu.
- **MEDIA (L2).** Access to Media Library, a thumbnail grid of recorded video and snapshot files (Figure 10).
- **IBIT (L3).** Enter Initiate Built-In-Test (IBIT) menu (Figure 22). Checks system functionality.
- **NVIS SETTINGS (OPTIONAL) (L4).** Enter NVIS Settings submenu (Figure 21).
- **UTILITY (R1).** Enter Tools submenu (Figure 23). (Start-up Options; Programmable Softkey Set-up; Factory Reset).
- **EXIT (R5).** Returns to Power ON view (Figure 4).

# VIEW MODE MENU

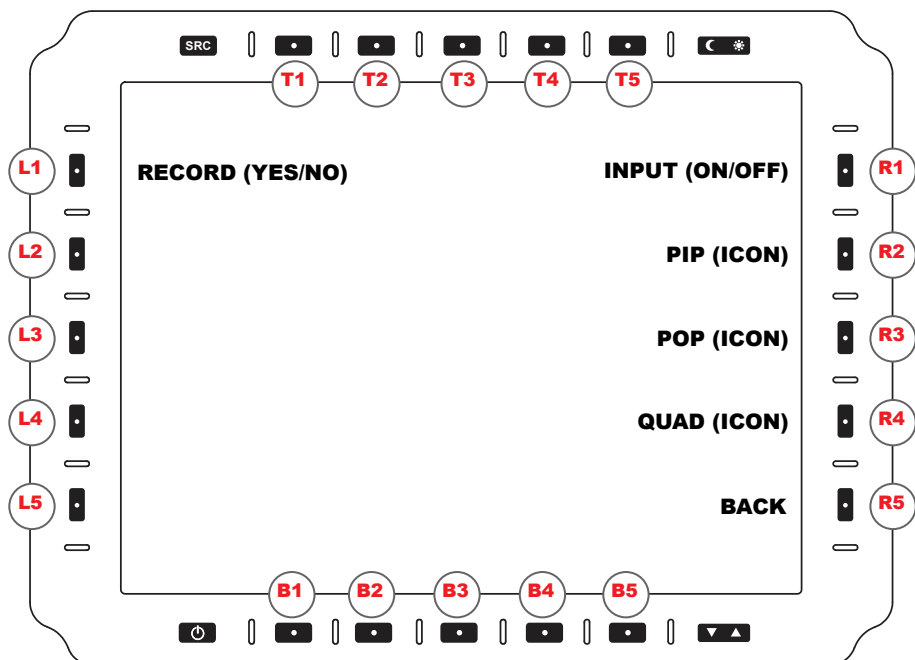


Figure 9

## VIEW MODE MENU

View Mode Menu is dedicated to selecting specific video settings for each physical port. View settings are independent of each other. View Mode Menu (Figure 9) is accessed from L1 in the Main Menu (Figure 8). Video Scaling Options (R1 - 4 Keys) are linked from the View Mode Menu.

Across the lower edge of the front bezel are the 'B' (Bottom) softkeys. On the right side are the 'R' (RIGHT) softkeys. See below for instructions.

**RECORD (L1).** Records primary video source feed. Border is drawn around recorded feed. Only one video source can be recorded at a time.



*Video Feed Settings are configured independently of each other.*

**C1 (B1).** Edit Composite 1 video options.

**C2 (B2).** Edit Composite 2 video options.

**C3 (B3).** Edit Composite 3 video options.

**C4 (B4).** Edit Composite 4 video options.

# VIDEO MODE MENU (CONTINUED)

## Video Scaling Options

---

There are Video Scaling Options available to customize the video feed view on the DVR's display screen. These control softkeys are located on the front bezel, right.

INPUT (ON/OFF) (Source) (R1). Select INPUT to choose ENABLE (ON) or DISABLE (OFF) input from the Source (**SRC**) selection.

PIP (R2). Select PIP to enter the Picture-In-Picture (PIP) layout menu. This feature is reviewed in a following menu section.

POP (R3). Select POP to enter the Picture-Over-Picture (POP) layout menu. This feature is reviewed in a following menu section.

QUAD (R4). Select QUAD to enter the QUAD layout menu. This feature is reviewed in a following menu section.

BACK (R5). Returns to Main Menu (Figure 8).

***This section is intentionally left blank.***

# MEDIA MENU

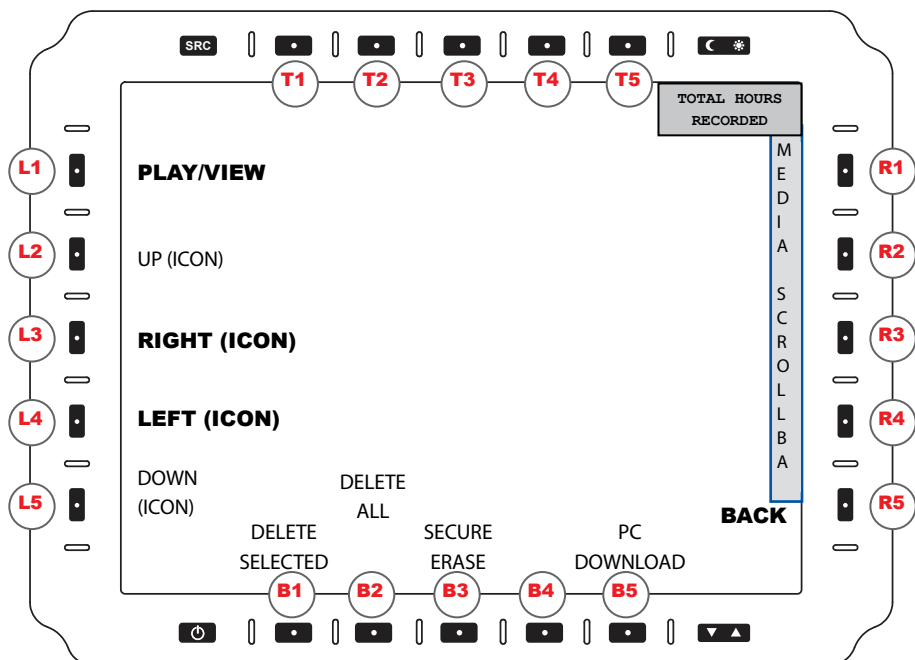


Figure 10

## MEDIA Menu

The Media Menu is the access point to view stored video and snapshot JPG image files, represented in chronological order in a thumbnail grid.

Video and Snapshot files are stored in the Media Gallery and are represented by a 4 x 3 thumbnail grid. The most recent recording defaults to the last position in the gallery grid. Files are numbered in ascending order (most recent recording is the greatest number). Files are named with a Time/Date stamp indicating recording start time or image record.

Video and Snapshot files are deleted using bottom row keys, B1- B3.

**TOTAL HOURS RECORDED.** A Total Hours Recorded message appears in the screen's upper right corner. Example: 5 hours, 30 minutes.

**MEDIA SCROLLBAR.** The Media Scrollbar on the right indicates where the user is in the Media Gallery.

**PLAY (L1).** Displays if video is selected, then starts playback of selected file. Screen reads 'PLAY' if video is selected, otherwise 'View' is displayed for snapshot image.

**VIEW (L1).** Displayed if image is selected, then shows selected file. This takes user to Snapshot Viewer Menu (see Figure 15).

## MEDIA MENU (CONTINUED)

**UP (L2).** Navigates Up a Row.

**RIGHT (L3).** Navigates to Next Media File.

**LEFT (L4).** Navigates to Previous Media File.

**DOWN (L5).** Navigates Down a Row.

**DELETE SELECTED (B1).** Opens Confirm Delete Menu and deletes the selected Media file.

**DELETE ALL (B2).** Opens Confirm Delete Menu and delete All Media files.

**SECURE ERASE (B3).** Opens Confirm Delete Menu and securely wipes all data (videos and snapshots) from Media Library storage.

**PC DOWNLOAD (B5).** Starts USB PC download.

**BACK (R5).** Returns to Main Menu (Figure 8).

*This section is intentionally left blank.*

# CONFIRM DELETE MENU

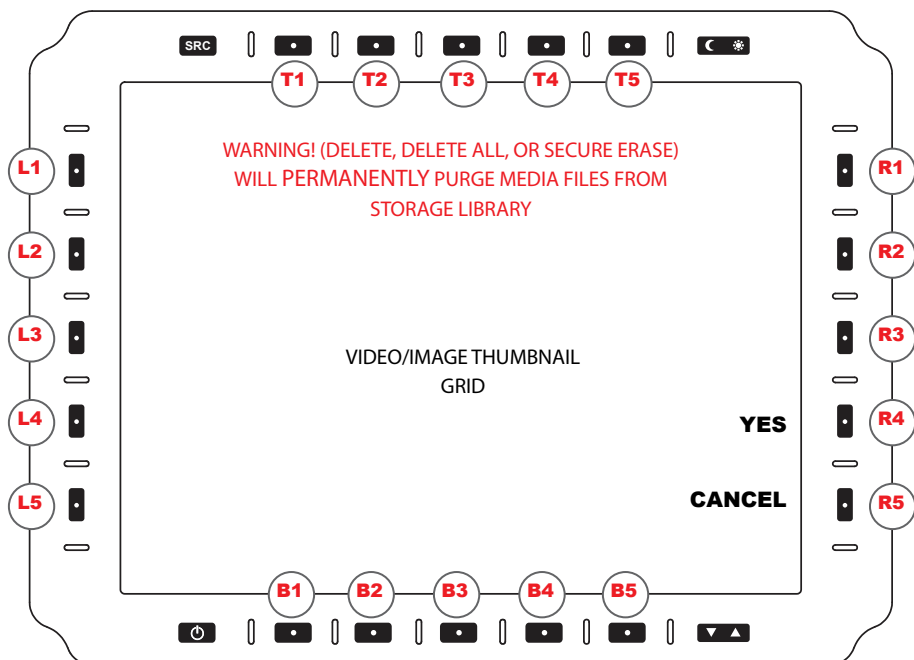


Figure 11

## CONFIRM DELETE Menu

**WARNING! DELETE, DELETE ALL, OR SECURE ERASE WILL PERMANENTLY PURGE MEDIA FILES FROM STORAGE LIBRARY**

After selecting any Delete action keys (B1 - B3) on Media Menu, the Confirm Delete Menu opens, Figure 11

Note the **WARNING TEXT**. Confirm Delete Selected, Delete All or Secure Erase before performing action.

**YES (R4)**. Confirm Delete Action (Delete Selected, Delete All, or Secure Erase. For more on the Secure Erase process, see Secure Erase Menu (Figure 13).

**CANCEL (R5)**. Aborts action and returns to the Media Menu screen (Figure 10).



### CAUTION!

**Remember! A DELETED video file is not retrievable.**

# PC DOWNLOAD MENU

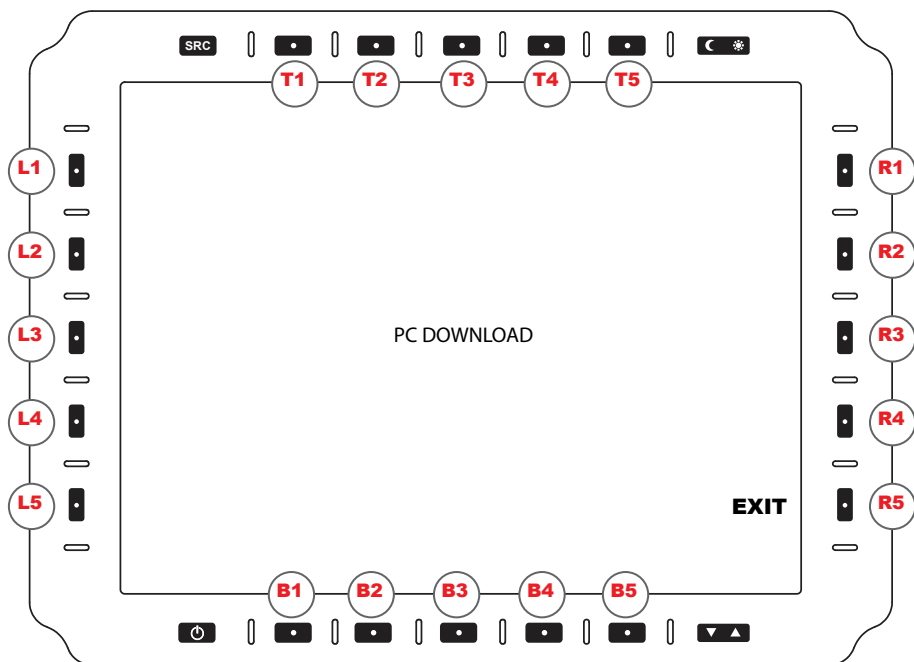


Figure 12

## PC DOWNLOAD Menu

This is the Screenshot during USB-to-PC download activity (Figure 12).

**EXIT (R5).** Returns to Main Menu (Figure 8).

### Download Media Gallery to PC

Video Files can be transferred from DVR to PC through the USB port using a USB cable. In PC Download Mode, Display appears as a remote disk drive when connected to a PC. Do not connect the USB cable between Display and PC until Display is in PC Download Mode.

- Power ON Computer
- Connect USB Cable to Display; Do not connect cable to Computer
- Power ON Display
- In Display, go to Media Menu (Figure 10)
- Select PC Download Key (B5)
- Screen reads PC Download Menu (above, Figure 12)
- Plug USB Cable into Computer
- Verify Computer reads USB Device (as a disk drive), and
- Complete the download
- To Exit, select Exit key (R5); returns screen to Main Menu (Figure 8).

# SECURE ERASE MENU

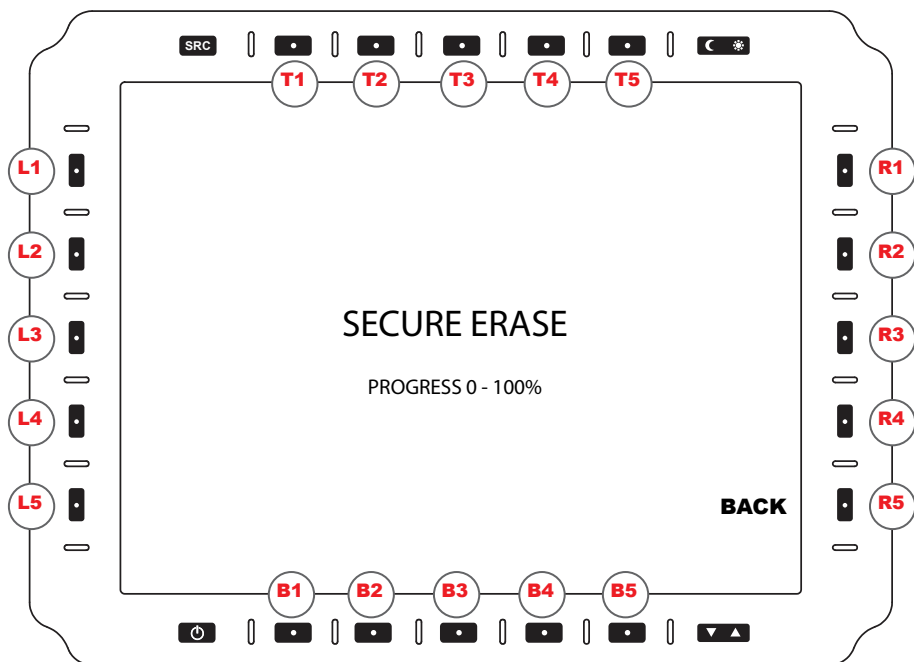


Figure 13

## SECURE ERASE Menu

This Screenshot allows the user to view the status of Secure Erase as it is performed.

**BACK (R5).** Returns to Media Menu (Figure 8).

### Secure Erase Process

Suggested use of the Secure Erase function is any event requiring User to leave no video or snapshot data behind.

- Access Secure Erase (B3) from the Media Menu (Figure 10).
- Warning text appears: **WARNING! SECURE ERASE WILL PERMANENTLY PURGE MEDIA FILES FROM STORAGE LIBRARY**
- Takes approximately 10 minutes to complete.
- Power must be applied to the display during the SE process.
- If unit should loose power during SE, process will complete upon next Power ON.
- During SE, a message indicates Secure Erase Progress (X) % to complete.
- When SE has completed, unit returns to live video record mode.
- While SE is in process, unit's DVR recording functions are disabled.
- Live Feed video and other menus are commonly available during Secure Erase.

# VIDEO PLAYBACK MENU

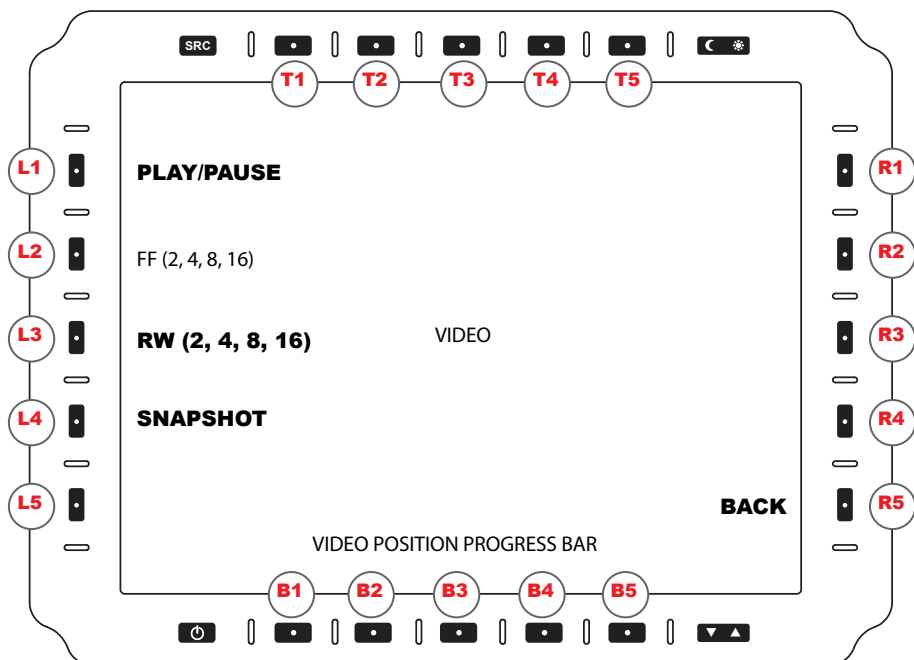


Figure 14

## VIDEO PLAYBACK Menu

Video Playback Menu allows user to review previously recorded videos. Select the video to play from the thumbnail gallery.

**PLAY/PAUSE (L1).** Toggles between Play and Pause. Press to Play video. Press again to Pause.

**FF (2, 4, 8, 16) (L2).** Fast Forward video at increasing rates of 2x, 4x, 8x and 16x.

- Press PLAY/PAUSE to stop fast forward action, and
- Press PLAY/PAUSE again to resume video play.

**RW (2, 4, 8, 16) (L3).** Rewind video at increasing rates of 2x, 4x, 8x and 16x.

- Press PLAY/PAUSE to stop rewind action, and
- Press PLAY/PAUSE again to resume video play.

**SNAPSHOT (L4).** Takes Snapshot of Video Playback frame image from the saved Video in play; Snapshot is saved with current Time/Date stamp to Media Library (Figure 10). After Snapshot is taken, screen returns to the Video currently playing in Video Playback.

**BACK (R5).** Returns to Main Menu (Figure 8).

# SNAPSHOT VIEWER MENU

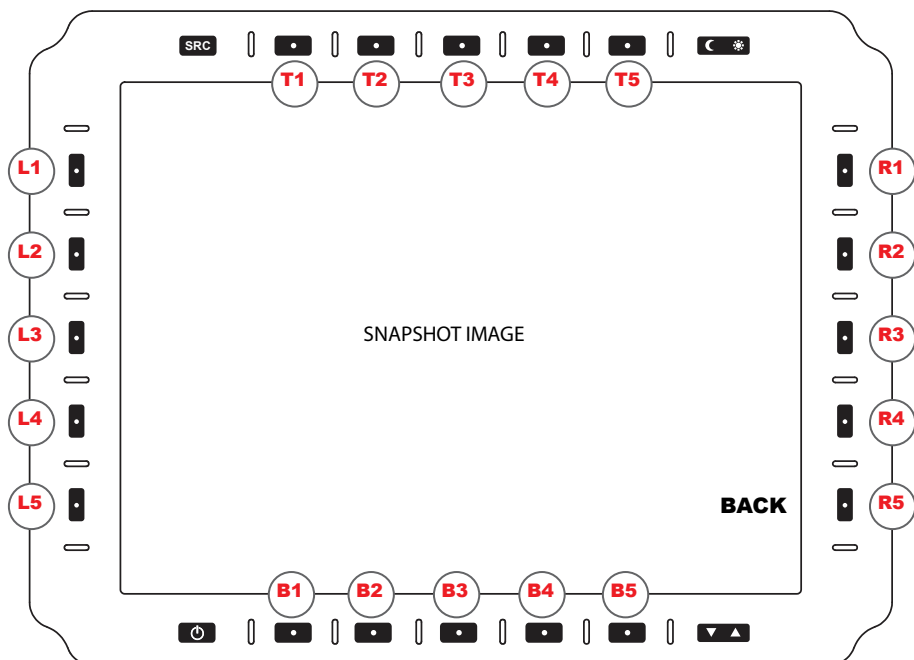


Figure 15

## SNAPSHOT VIEWER Menu

The Snapshot Viewer Menu screens appears when accessed through the Snapshot Key (R5) in the Power ON View Menu (Figure 4). This screenshot allows the user to confirm the Snapshot image.

BACK (R5). Returns to Power ON View (Figure 4).

*This section is intentionally left blank.*

# PICTURE-IN-PICTURE (PIP) OPTIONS MENU

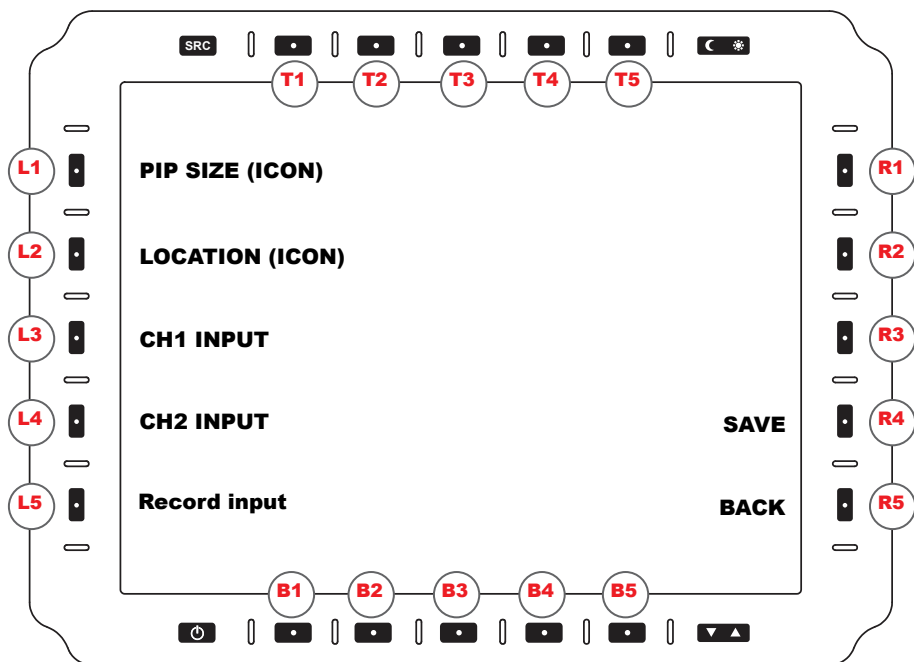


Figure 16

## Picture-In-Picture (PIP) Options Menu

To enter the PIP (Picture-In-Picture) Options Menu (Figure 16), select PIP (R2) from View Mode Menu (Figure 9). User determines video feed assigned to dual-view setting.

**Note:** *Keys are active on the input displayed in the larger view.*

PIP SIZE (L1). Cycles through three (3) window sizes: Small, Medium; Large. Each press increases size, then returns PIP default (Small).

LOCATION (L2). Cycles through five (5) screen locations: Top Left, Top Right, Center, Bottom Left, and Bottom Right.

CH1 INPUT (L3). Cycles CH1 input sources for configuration in PIP view.

CH2 INPUT (L4). Cycles CH2 input sources for configuration in PIP view.

RECORD (L5). Select the input to record. Border draws around the recorded feed.

SAVE (R4). Opens Save View Menu (See Section Save View Menu, Figure 19).

BACK (R5). Returns to View Mode Menu (Figure 9).

# PICTURE-OVER-PICTURE (POP) OPTIONS MENU

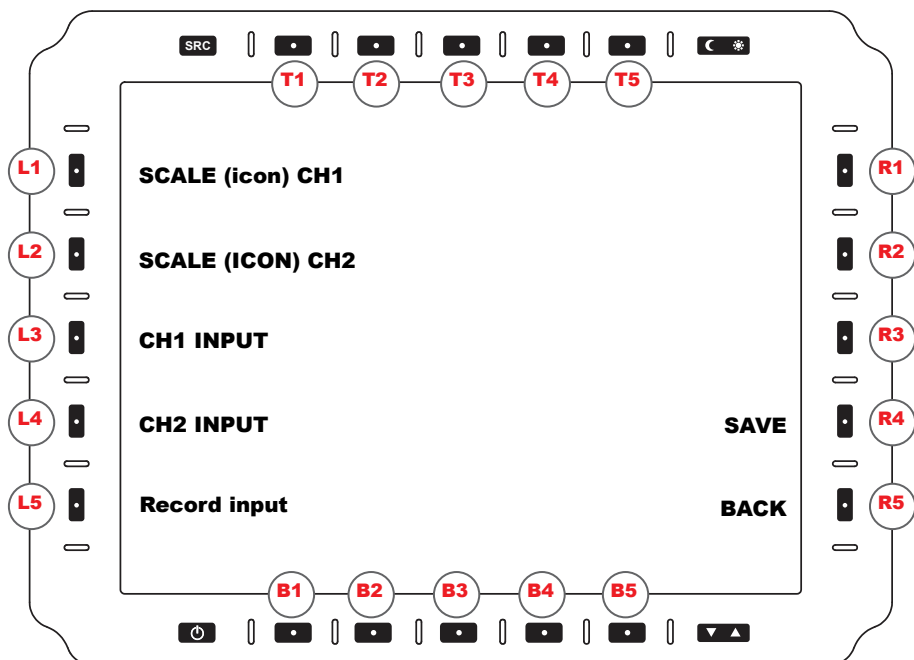


Figure 17

## Picture-Over-Picture (POP) Options Menu

To enter the POP (Picture-Over-Picture) Options Menu (Figure 17), select POP (R3) from View Mode Menu (Figure 9). User determines input feed assigned to dual-view POP setting.

POP settings are Stretched or Cropped. Cropped scaling displays the middle 50% of video and crops the top and bottom by 25%.

SCALE CH1 (L1). Cycles Top Window options: Stretched or Cropped; Fit; 1:1.

SCALE CH2 (L2). Cycles Bottom Window options: Stretched or Cropped; Fit; 1:1.

CH1 INPUT (L3). Cycles through CH1 input sources.

CH2 INPUT (L4). Cycles through CH2 input sources.

RECORD (L5). Select the input to Record. Border draws around the recorded feed.

SAVE (R4). Opens Save View Menu (See Section Save View Menu, Figure 19).

BACK (R5). Returns to View Mode Menu (Figure 9).

# QUAD OPTIONS MENU

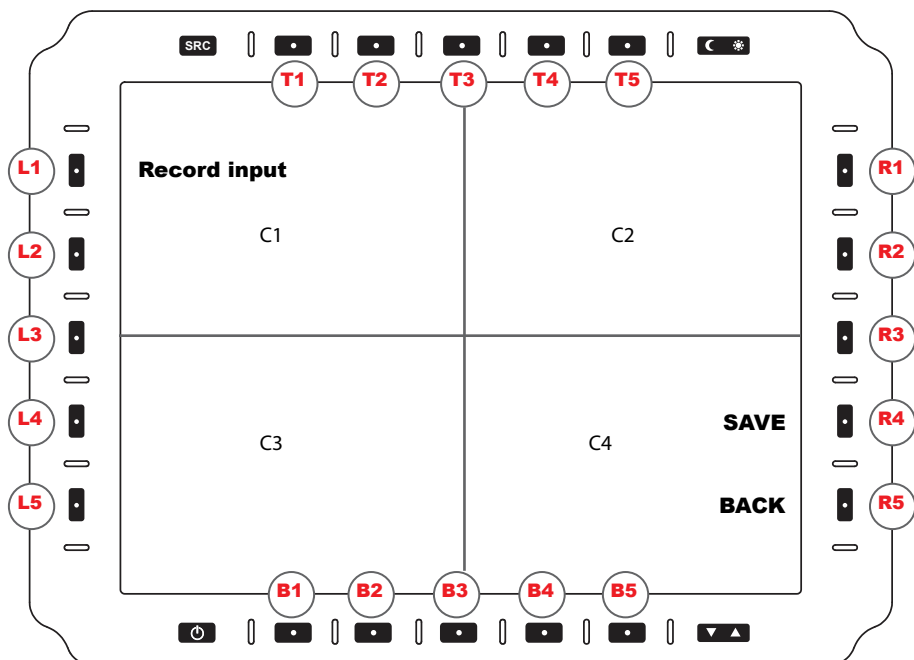


Figure 18

## Quad Options Menu

The QUAD Option, accessed from (R4) in View Mode Menu (Figure 9), allows for up to (4) video sources to be viewed (Figure 18). If a video feed should be unavailable, that quadrant should appear black.

- **C1 FEED.** Top Left screen quadrant
- **C2 FEED.** Top Right screen quadrant
- **C3 FEED.** Bottom Left screen quadrant
- **C4 FEED.** Bottom Right screen quadrant

RECORD (L1). Select the input to Record. A Border draws around the recorded feed.

SAVE (R4). Opens Save View Menu (Figure 19).

BACK (R5). Returns to View Mode Menu (Figure 9).

# SAVE VIEW MENU

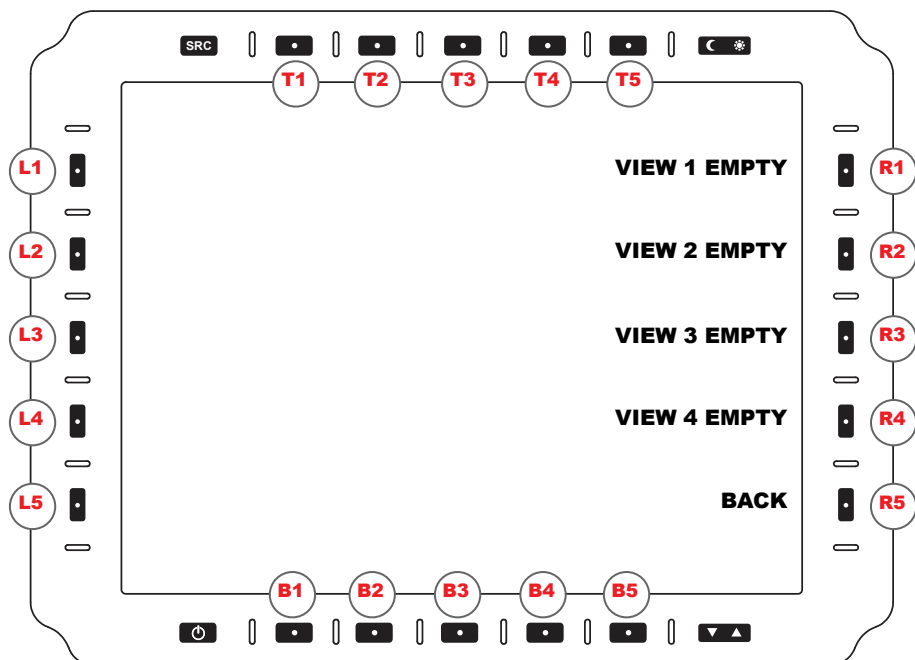


Figure 19

## Save View Menu

Use the Save View Menu (Figure 19) to save PIP (Figure 16), POP (Figure 17), or QUAD (Figure 18) configurations. Select entry using R (Right) softkeys. Go to section Name Entry Menu (Figure 20) to name view configurations.

VIEW 1 (R1). Saves to PIP/POP/QUAD View 1 entry. Name Entry Menu (Figure 20) opens.

VIEW 2 (R2). Saves to PIP/POP/QUAD View 1 entry. Name Entry Menu (Figure 20) opens.

VIEW 3 (R3). Saves to PIP/POP/QUAD View 1 entry. Name Entry Menu (Figure 20) opens.

VIEW 4 (R4). Saves to PIP/POP/QUAD View 1 entry. Name Entry Menu (Figure 20) opens.

BACK (R5). Returns to previous menu (PIP/POP/QUAD).

# NAME VIEW ENTRY MENU

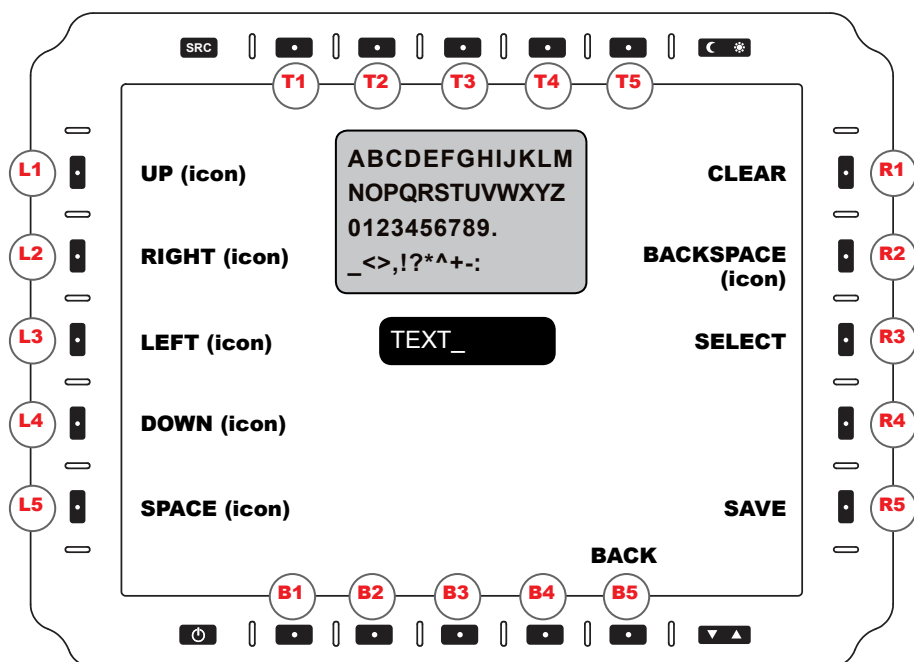


Figure 20

## Name VIEW Entry Menu

The Name Entry Menu (Figure 20) is where the user can name the Save View previously created. (Figure 19). Access to this screen is through the Save View Menu, Figure 19. Use the Left and Right softkeys to navigate. Text assigned will appear in the TEXT field on the screen.

UP (L1). Navigates Selection Cursor UP.

RIGHT (L2). Navigates Selection Cursor RIGHT.

LEFT (L3). Navigates Selection Cursor LEFT.

DOWN (L4). Navigates Selection Cursor DOWN.

SPACE (L5). Adds an empty SPACE (as in a spacebar press).

CLEAR (R1). Clears Character.

BACKSPACE (R2). Deletes Last Character.

SELECT (R3). Enters Character.

SAVE (R5). Exits Menu while saving changes.

BACK (B5). Returns to Save View Menu (Figure 19).

# NVIS SETTINGS MENU (OPTIONAL)

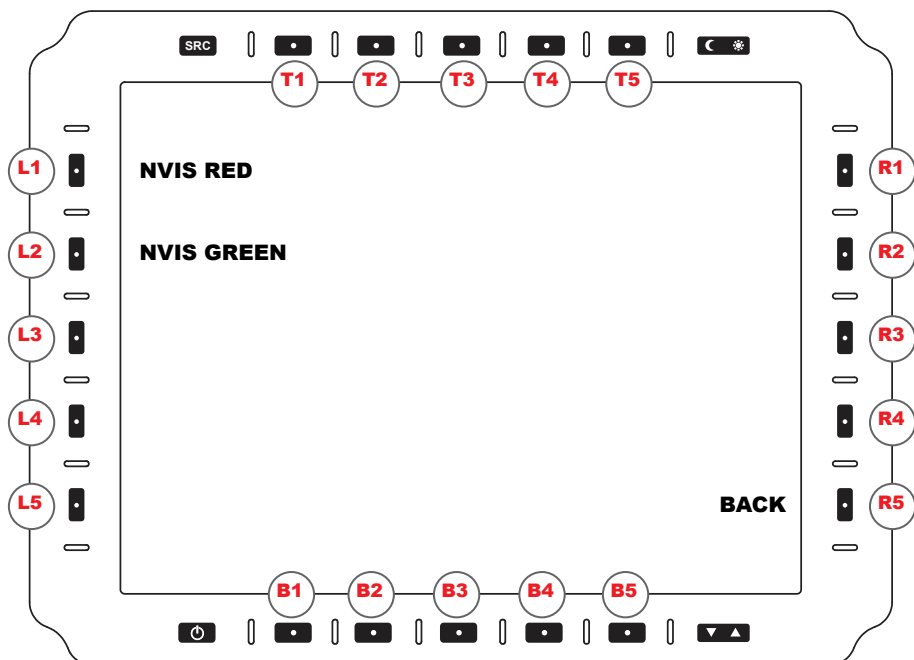


Figure 21

## NVIS Settings Menu (Optional)

The NVIS Red/Green viewing capability (optional) allows interfacing with night vision devices without adverse effects. The NVIS Setting Menu (Figure 21) is accessed through L4 from the Main Menu (Figure 8), and allows the user to make NVIS viewing color selections.

NVIS RED (L1). Selects the NVIS RED view color.

NVIS GREEN (L2). Selects the NVIS GREEN view color. Factory default is GREEN.

BACK (R5). Returns to MAIN MENU (Figure 8).

*This section is intentionally left blank.*

# IBIT MENU

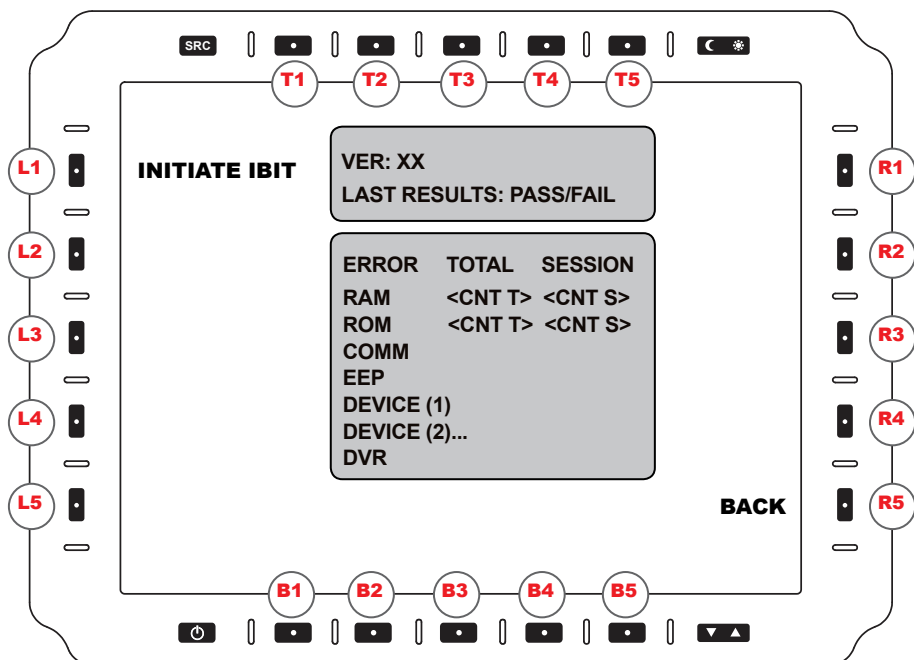


Figure 22

## Initiate BIT (IBIT) Menu

The DVR supports a Built-In-Test component, Initiate BIT (IBIT) (Figure 22). This process detects and isolates faults to help the user identify the operational readiness, or where necessary, identify degraded or failed system conditions. Results of failures are stored in memory. Access to the IBIT screen is through the Main Menu, Figure 8.

**INITIATE IBIT (L1).** Running Initiate BIT (IBIT) allows the user to confirm all systems are functioning. Results are shown as counts per category in the test log box in the center of the display screen. Select INITIATE IBIT (L1) to start the process (Figure 22).

**TEST LOG BOX FIELDS.** The Test Log Box Fields indicate the following:

- Version of IBIT test run
- Lists the overall result of last IBIT test: PASS or FAIL
- TOTAL: Lists the total ERROR count from unit's initial Power ON (manufacture date)
- SESSION: Lists the ERROR count from unit's current Power ON session, and
- Lists an Error Code (See ERROR CODES, TABLE 10).

**ERROR CODES.** If there are conflicts within the DVR, they may be indicated by one or more of the following ERROR CODES (see TABLE 10).

**BACK (R5).** Returns to Main Menu (Figure 8).

# IBIT MENU (CONTINUED)

| ERROR CODES | ERROR CODE EXPLANATION                  |
|-------------|-----------------------------------------|
| RAM         | Internal RAM Failure                    |
| ROM         | ROM Checksum Failure                    |
| COMM        | Serial Communication Error              |
| EEP         | EEP File Error                          |
| DEVICE (1)  | Communication Video Decoder             |
| DEVICE (2)  | Communication with Keys/Buttons Circuit |
| DVR         | Communication Error with DVR            |

Table

***This section is intentionally left blank.***

# UTILITY MENU

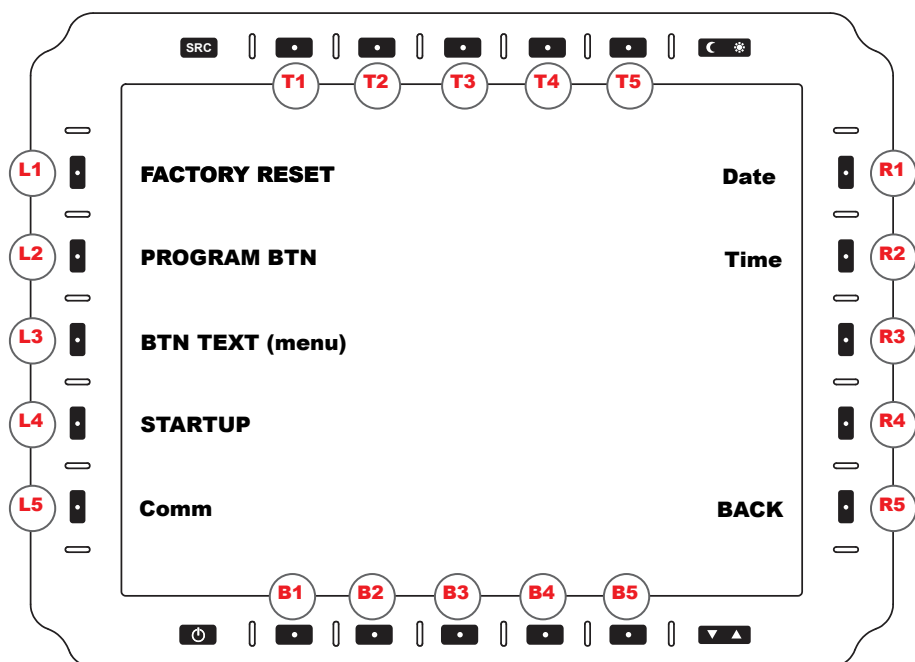


Figure 23

## Utility Menu

From the Main Menu (Figure 8), the Utility Menu (Figure 23) is accessed through R1.

**FACTORY RESET (L1).** Select FACTORY RESET to reset to factory defaults:

- VIDEO SOURCES: All ENABLED; Composites (RS170) (4)
- SERIAL COMMUNICATIONS PORTS: Sets to RS232
- NVIS COLOR (If Option is installed): Sets to GREEN
- CONTRAST: Resets to a predetermined factory setting, and
- KEY DOWN/KEY UP: Restores to Text List (See Section Communication Protocol > Factory Default Key Down and Key Up Transmit Text).
- BUTTON TEXT: restores to Always ON.

**PROGRAM BTN (L2).** Initiates Programmable Softkey (Setup) Menu (Figure 29).

**BTN TEXT (MENU) (L3).** Supports OSD timeout options of Button Label Text after opening a menu or following a button press. Cycle through the options of **1: Always ON (default).** **2: Hide.** **3: Timeout 3 sec.** **4: Timeout 5 sec.** **5: Timeout 7 secs.**

**STARTUP (L4).** Opens Startup Menu (Figure 26).

**COMM (L5).** Opens Communications Options Menu (Figure 28).

**DATE (R1).** Opens Date Adjust Menu (Figure 24).

**TIME (R2).** Opens Time Adjust Menu (Figure 25).

**BACK (R5).** Returns to Main Menu (Figure 8).

# DATE ADJUST MENU

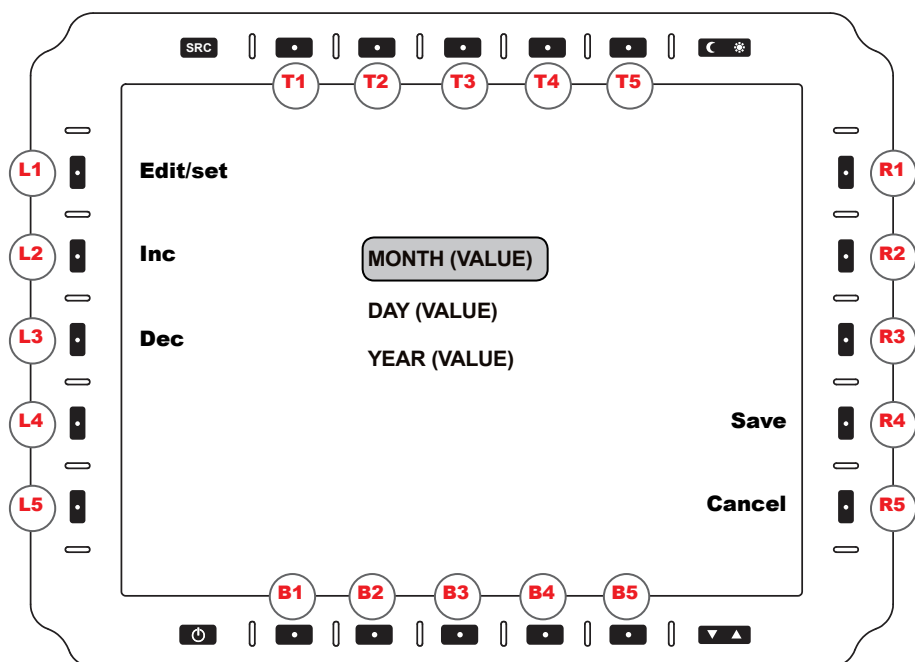


Figure 24

## DATE ADJUST Menu

The Date Adjust Menu (Figure 24) is accessed through R1 on the Main Menu screen (Figure 8). This menu allows the user to establish DATE settings. The highlight indicates the value to be changed.

**EDIT/SET (L1).** Select to begin editing selected value (MONTH, DAY OR YEAR). Set value to selected item (MONTH, DAY OR YEAR).

**INC (L2).** Navigate to next item (MONTH, DAY OR YEAR) or increment selected value if editing.

**DEC (L3).** Navigate to previous item (MONTH, DAY OR YEAR) or decrement selected value if editing.

**CANCEL (R5).** Returns to Utility Menu (Figure 23) without saving changes.

**SAVE (R4).** Saves the DATE and returns to Utility Menu (Figure 23).

# TIME ADJUST MENU

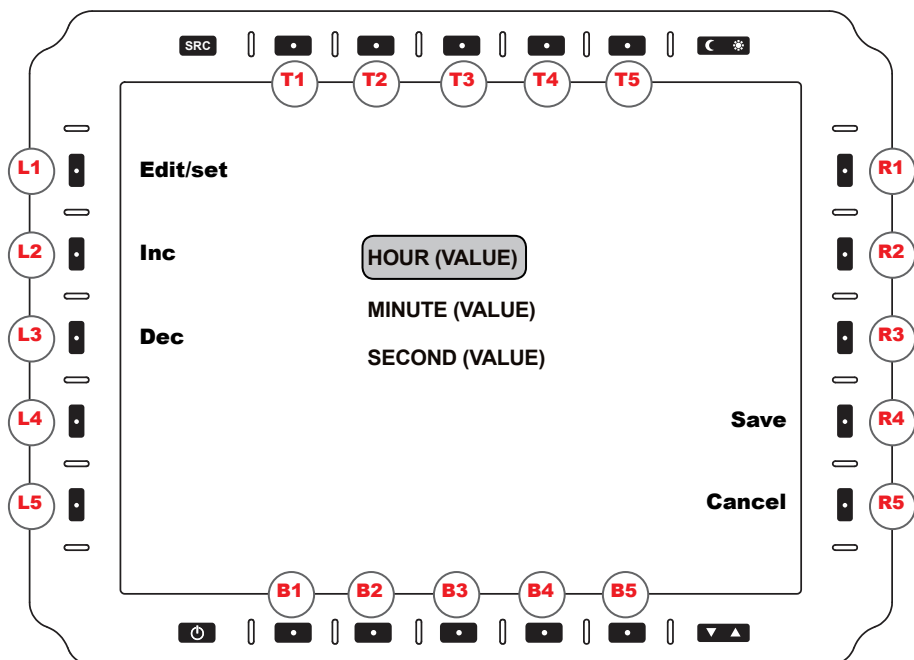


Figure 25

## TIME ADJUST Menu

The Time Adjust Menu (Figure 25) is accessed through R1 in the Main Menu screen (Figure 8). This menu allows the user to establish TIME settings. The highlight indicates the value to be changed.

**EDIT/SET (L1).** Select to begin editing selected value (HOUR, MINUTE, or SECOND). Set value to selected item (HOUR, MINUTE, or SECOND).

**INC (L2).** Navigate to next item (HOUR, MINUTE, or SECOND) or increment selected value if editing.

**DEC (L3).** Navigate to previous item (HOUR, MINUTE, or SECOND) or decrement selected value if editing.

**CANCEL (R5).** Returns to Utility Menu (Figure 23) without saving changes.

**SAVE (R4).** Saves the DATE and returns to Utility Menu (Figure 23).

# STARTUP MENU

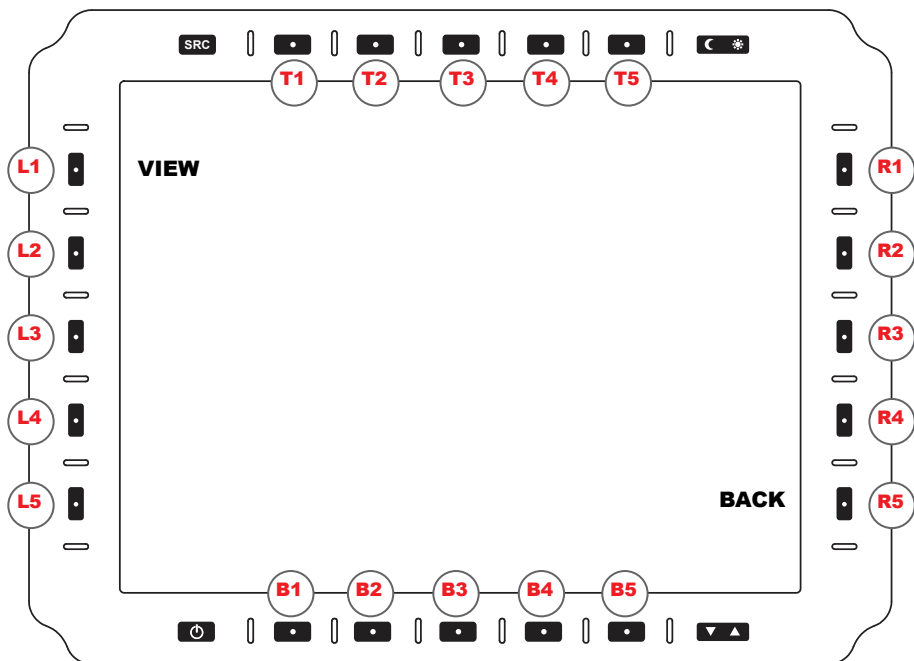


Figure 26

## Startup Menu

The Startup Menu (Figure 26) is accessed through softkey L4 in the Utility Menu screen (Figure 23),

VIEW (L1). Enters View Startup Menu (Figure 27).

BACK (R5). Returns to Utility Menu (Figure 23).

*This section is intentionally left blank.*

# VIEW STARTUP MENU

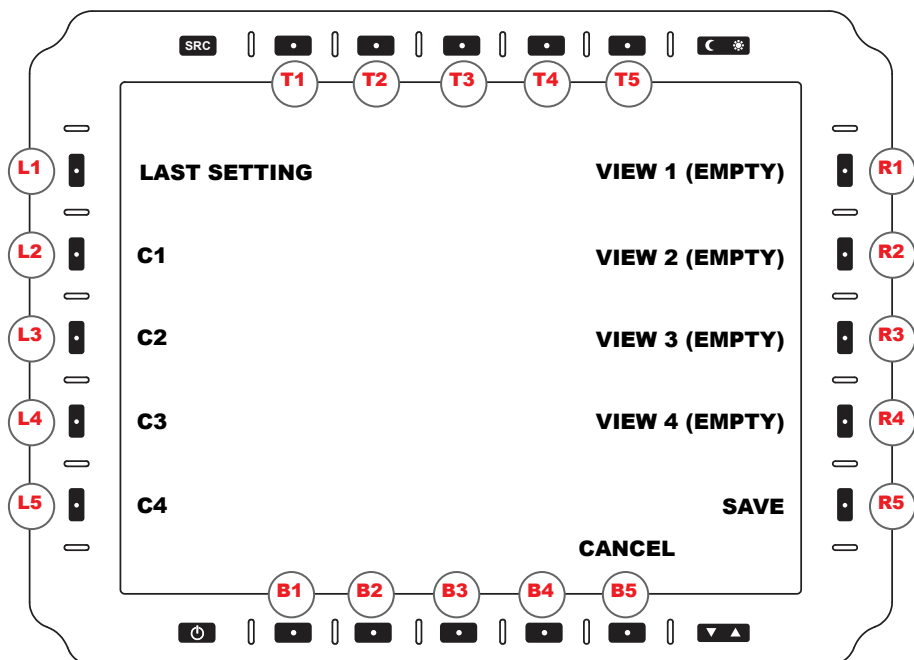


Figure 27

## View STARTUP Menu

The View Startup Menu (Figure 27) is accessed through softkey L1 in the Startup Menu screen (Figure 26),

**LAST SETTING (L1).** Starts with last used view.

**C1 (B1).** Starts with Composite 1 full screen.

**C2 (B2).** Starts with Composite 2 full screen.

**C3 (B3).** Starts with Composite 3 full screen.

**C4 (B4).** Starts with Composite 4 full screen.

**VIEW 1 (R1).** Starts with PIP/POP/QUAD View 1.

**VIEW 2 (R2).** Starts with PIP/POP/QUAD View 2.

**VIEW 3 (R3).** Starts with PIP/POP/QUAD View 3.

**VIEW 4 (R4).** Starts with PIP/POP/QUAD View 4.

**SAVE (R5).** Saves Selection for Power ON view. Auto-returns to Startup Menu (Figure 26).

**CANCEL (B5).** Cancels entry. Returns to Startup Menu (Figure 26).

# COMMUNICATIONS OPTIONS MENU

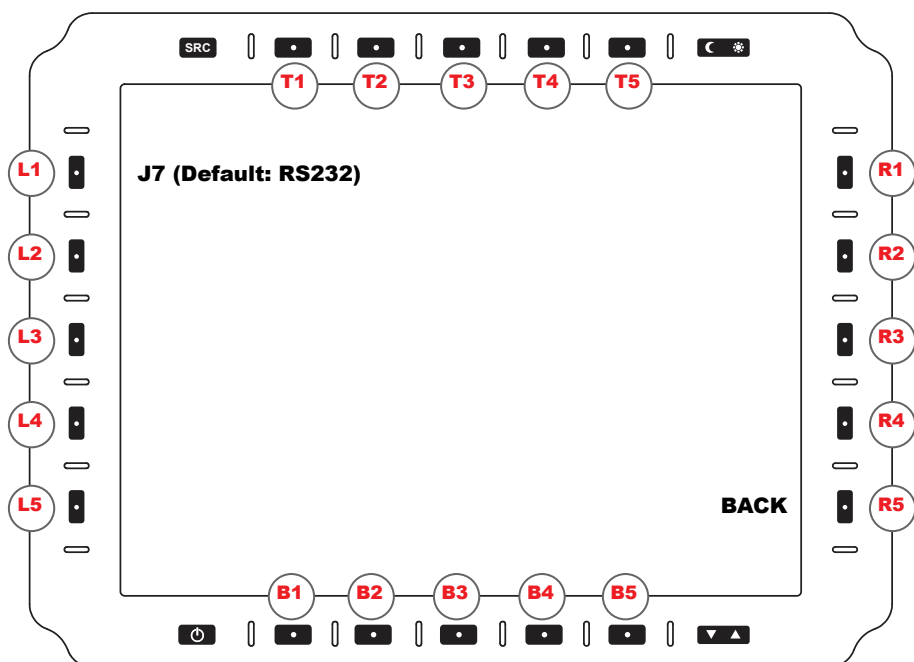


Figure 28

## COMMUNICATIONS Options Menu

The Communications Options Menu (Figure 28) is accessed through softkey L5, COMM in the Utility Menu screen (Figure 23),

When Video 1 is displayed, external communication is possible the J7 COMM port. using bezel keys.

When Video 2, Video 3 or Video 4 are displayed, no external communication is possible through the J7 COMM port with the bezel keys.

J7 (L1). Select RS232 (default), RS422 or OFF for J7 port.

BACK (R5). Returns to Start Up (Figure 26).

***This section is intentionally left blank.***

# PROGRAMMABLE SOFTKEY MENU (SELECT BUTTON)

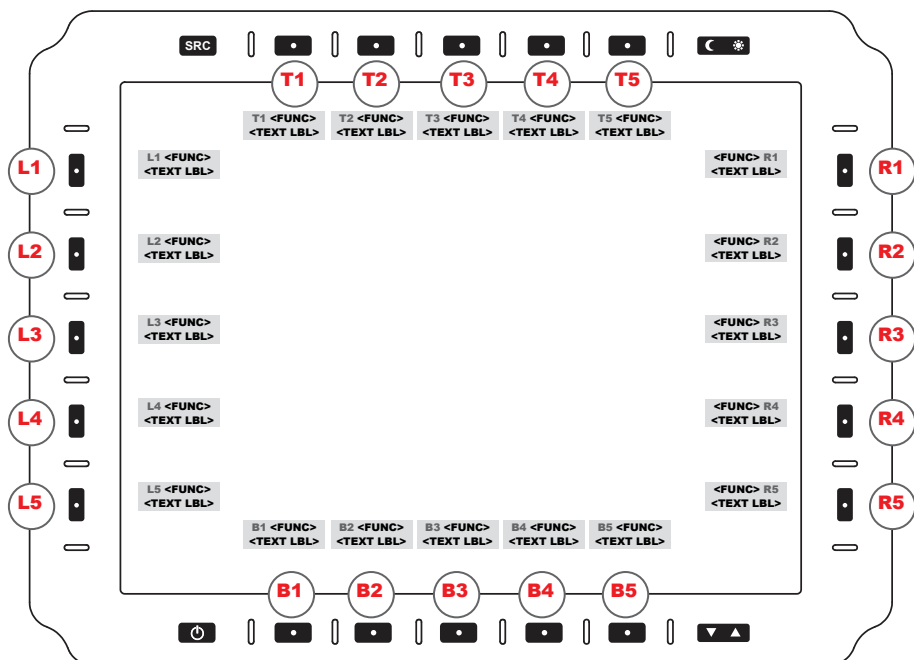


Figure 29

## Programmable SOFTKEY Assignment Menu (Select Button)

The front bezel twenty (20) softkeys are in a layout of five keys on the left (L1-5), right (R1-5), bottom (B1-5) and top, (T1-5) (Figure 29). Use these keys to select on-screen menu options. The keys are illuminated in Day or Night mode and off in Off mode. Night luminance is subdued to match existing platform night lighting.

Identification of the assigned function should be visible next to the key selected.

***Additional softkey information is communicated over the serial communication link as provided by the Host device.***

### Multiple Key Press

The Multiple Key Press feature enables the user to press parallel keys, which if programmed, will support additional choices to the top level 20 softkeys. Keys can be pressed simultaneously; they will transmit their respective up or key down message as they are pressed and released.

For example, L1-down (hold) followed by L2-down.

### Alternate Programming Software

Alternate Programming Software allows for customizing the OSD labels, key functions, and Key Down/Up messages. See MarinePC's website for the instructions document or e-mail: [info@marinepc.com](mailto:info@marinepc.com) for assistance.

# PROGRAMMABLE SOFTKEY MENU (SET FUNCTION)

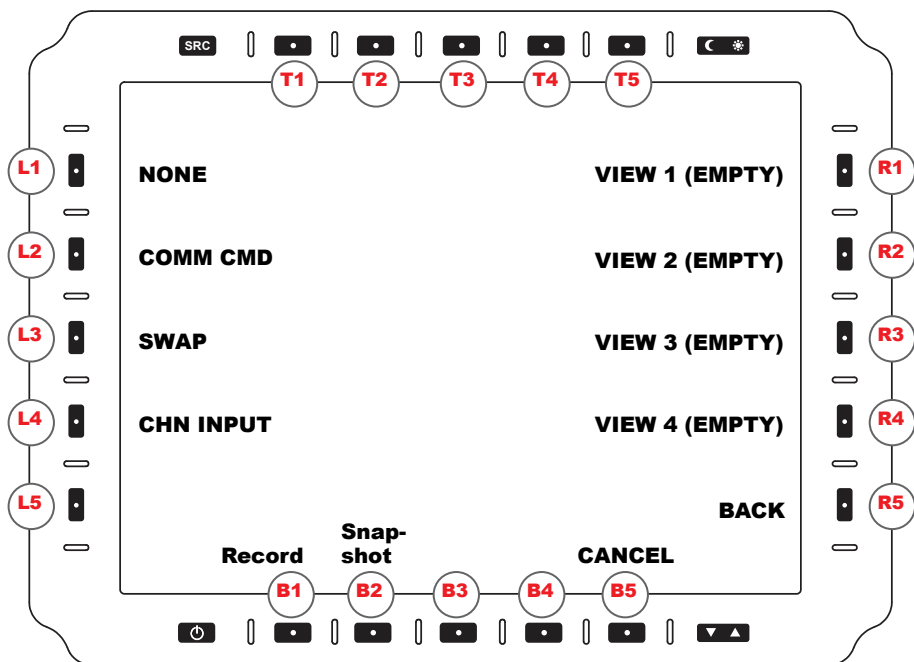


Figure 30

## Programmable SOFTKEY Menu (Set Function)

User selects a key (Figure 30) to set a specific function into the key. A virtual keyboard appears to input the assigned function's identification.

**NONE (L1).** No action takes place when key is pressed.

**COMM CMD (L2).** Programmed text command transmits when key is pressed.

**SWAP (L3).** CH1 and CH2 swap inputs.

**CHN INPUT (L5).** Opens Input Function Menu.

**RECORD (B1).** Starts or stops a Recording.

**SNAPSHOT (B2).** Takes a Snapshot (JPG) of source in the view; saved in Media Library.

**VIEW 1 (R1).** User-configured layout entry 1 toggles ON and OFF. 'Empty' displays or the saved PIP/POP/QUAD view name.

**VIEW 2 (R2).** User-configured layout entry 2 toggles ON and OFF. 'Empty' displays or the saved PIP/POP/QUAD view name.

**VIEW 3 (R3).** User-configured layout entry 3 toggles ON and OFF. 'Empty' displays or the saved PIP/POP/QUAD view name.

## SET FUNCTION (CONTINUED)

VIEW 4 (R4). User-configured layout entry 4 toggles ON and OFF. 'Empty' displays or the saved PIP/POP view name.

BACK (R5). Returns to Select Softkey Menu, (Figure 29).

CANCEL (B5). Cancels entry. Returns to Utility Menu (Figure 23).

***This section is intentionally left blank.***

# PROGRAMMABLE SOFTKEY (SET INPUT FUNCTION)

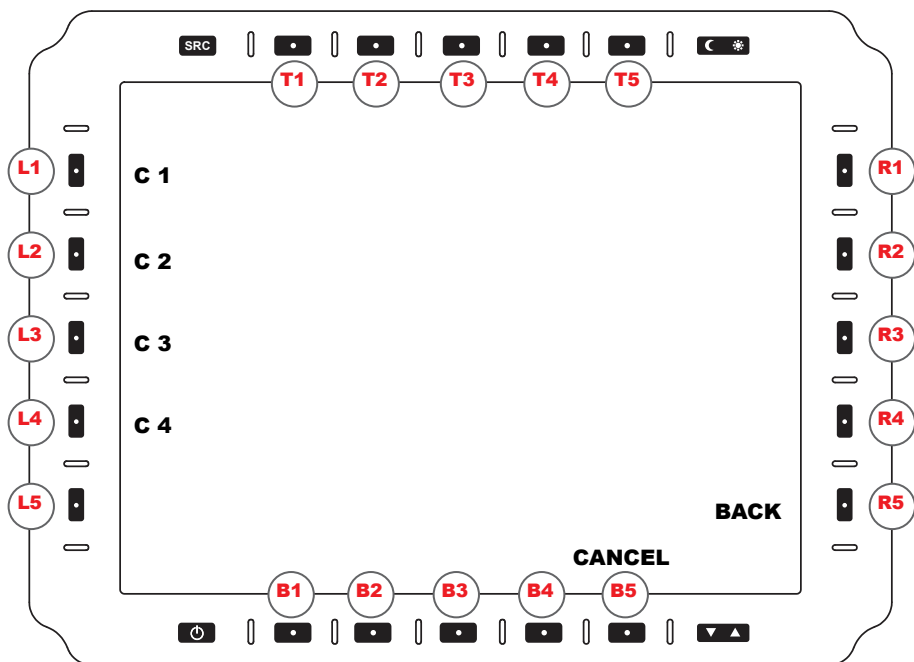


Figure 31

## Programmable SOFTKEY Menu (Set Input Function)

User selects a key (Figure 31) to set Video Feed input.

C1 (L1). CH1 displays the Composite 1 Input.

C2 (L2). CH1 displays the Composite 2 Input.

C3 (L3). CH1 displays the Composite 3 Input.

C4 (L4). CH1 displays the Composite 4 Input.

BACK (R5). Returns to Set Function Menu (Figure 30).

CANCEL (B5). Cancels entry; returns to Utility Menu (Figure 23).

# PROGRAMMABLE SOFTKEY MENU (ENTER NAME)

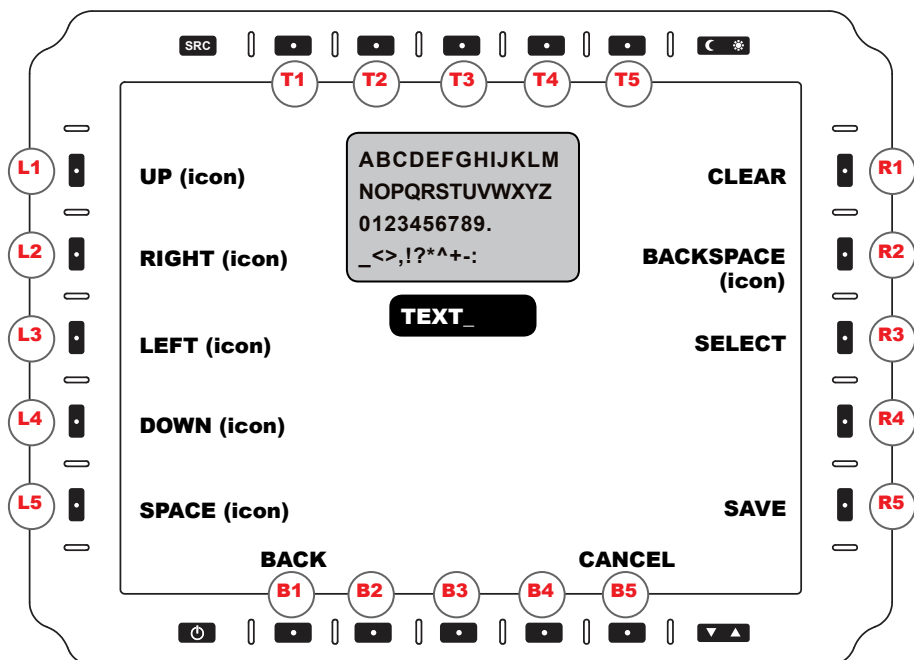


Figure 32

## Programmable SOFTKEY Menu (Enter Name)

User can enter custom text (Figure 32) for default screen key names. Select key; backspace to clear default test; customize.

SELECT (R3). Enters Character.

BACKSPACE (R2). Deletes Last Character.

CLEAR (R1). Clears the Text Entry.

UP (L1). Navigates Selection Cursor UP.

RIGHT (L2). Navigates Selection Cursor RIGHT.

LEFT (L3). Navigates Selection Cursor LEFT.

DOWN (L4). Navigates Selection Cursor DOWN.

SAVE (R5). Exits Menu and Saves Changes.

BACK (B1). Returns to Set Function Menu (Figure 30).

CANCEL (B5). Cancels entry; returns to Utility Menu (Figure 23).

# COMMUNICATION PROTOCOL

## Communication Protocol

The DVR protocol uses packets based on the NMEA message format. This consists of an ID, comma delimited fields, a checksum field and a two-character checksum. A response message is transmitted from the DVR upon receiving a message. It will either be the specific response for the command, a general DSACK response, or a DSNACK response if the command is not recognized or the packet is invalid.

### Physical and Data Link Layer

The DVR communicates via RS232 or RS422 interface using the following port settings (Table 11).

|                     |           |
|---------------------|-----------|
| <b>BAUD RATE</b>    | 19200 bps |
| <b>DATA BITS</b>    | 8         |
| <b>PARITY</b>       | NONE      |
| <b>START BITS</b>   | 1         |
| <b>STOP BITS</b>    | 1         |
| <b>FLOW CONTROL</b> | NONE      |

Table 11

### Package Message Format

The NMEA (standard protocol) message format is an ASCII string that consists of a message ID, comma delimited data fields and a checksum field. The message format is described in Table 12.

| LENGTH | VALUE                  | DESCRIPTION                                                                                                                                                                |
|--------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | '\$'                   | Packet Message Start Byte                                                                                                                                                  |
| 5      | MSGID                  | Message Identifier; first two characters represents the manufacturer (DS); last three are Command Code                                                                     |
| n      | Comma Delimited Fields | Field 0, Field 1, Field n                                                                                                                                                  |
| 1      | '*'                    | Checksum Delimiter Byte                                                                                                                                                    |
| 2      | Checksum               | Checksum is two ASCII characters representing a hexadecimal byte 00 to FF. Value is the exclusive OR (XOR) of all bytes between, but not including characters '\$' and '*' |

Table 12

# COMMUNICATION PROTOCOL (CONTINUED)

## Checksum Calculation

```
unsigned char ComputeChecksum(string text)
{
    unsigned char startIdx, endIdx, result;

    startIdx = Pos('$', text) + 1; //start at character after '$' in string
    endIdx = Pos('*', text) - 1;   //end at character before '*' in string
    result = 0;

    for(int n = startIdx; n <= endIdx; n++)
    {
        result = result ^ text[n];
    }

    return result;
}
```

## Commands

The following table references the commands the DVR supports (Table 13). (Table continues on the next page.)

| COMMAND | DIRECTION | RESPONSE    | DESCRIPTION                            |
|---------|-----------|-------------|----------------------------------------|
| DSKDN   | From DVR  | N/A         | Key pressed                            |
| DSKUP   | From DVR  | N/A         | Key released (from press)              |
| DSCDV   | To DVR    | DSACK/DSNAK | Change Display Video                   |
| DSIBT   | To DVR    | DSBTR/DSNAK | Initiates IBIT System Test (PSM)       |
| DSBTQ   | To DVR    | DSBTR/DSNAK | Requests last IBIT System Test results |
| DSBTR   | From DVR  | N/A         | IBIT System Test Response              |
| DSFWQ   | To DVR    | DSFWR/DSNAK | Request Firmware Version               |
| DSFWR   | From DVR  | N/A         | Firmware Version Response              |
| DSPKM   | To DVR    | DSACK/DSNAK | Program Key Mode                       |
| DSPKD   | To DVR    | DSACK/DSNAK | Program Key Down Text Msg              |
| DSPKU   | To DVR    | DSACK/DSNAK | Program Key Up Text Msg                |

Table 13

# COMMUNICATION PROTOCOL (CONTINUED)

## Commands (CONTINUED)

| COMMAND | DIRECTION | RESPONSE    | DESCRIPTION                                                                                           |
|---------|-----------|-------------|-------------------------------------------------------------------------------------------------------|
| DSPKF   | To DVR    | DSACK/DSNAK | Program Key Function                                                                                  |
| DSPKT   | To DVR    | DSACK/DSNAK | Program Key OSD Label Text                                                                            |
| DSKDQ   | To DVR    | DSKDR/DSNAK | Request Program Key Down TX Msg                                                                       |
| DSKUQ   | To DVR    | DSKUR/DSNAK | Request Program Key Up TX Msg                                                                         |
| DSKFQ   | To DVR    | DSKFR/DSNAK | Request Program Key Function                                                                          |
| DSKTQ   | To DVR    | DSKTR/DSNAK | Request Program Key OSD Label Text                                                                    |
| DSKDR   | To DVR    | N/A         | DSKDQ Response                                                                                        |
| DSKUR   | To DVR    | N/A         | DSKUQ Response                                                                                        |
| DSKFR   | To DVR    | N/A         | DSKFQ Response                                                                                        |
| DSKTR   | To DVR    | N/A         | DSKTQ Response                                                                                        |
| DSACK   | From DVR  | N/A         | Acknowledge Response; Used if DVR acknowledges command.                                               |
| DSNAK   | From DVR  | N/A         | Not Acknowledged Response; Used if command was not recognized by DVR or the command contained errors. |

Table 13

***This section is intentionally left blank.***

# COMMUNICATION PROTOCOL (CONTINUED)

## Protocol Message Commands

### DSKDN “Key Down” Command

---

The DSKDN Key Down command will transmit a message after a key has been pressed. The message transmitted can be programmed using the DSPKD (Program Key Down) command. Each key can transmit up to 20 bytes. If a custom message has not been programmed, a factory default message for the key will transmit.

| FIELD | NAME  | DATA                                                                           |
|-------|-------|--------------------------------------------------------------------------------|
| 0     | BTNID | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5 |

Example: \$DSKDN,L1\*07[CR][LF]

**Factory default** transmit message for top left key (L1) on Press Down.

L1D[CR][LF]

Message “\$DSPKD,L1,4C31440D0C\*47[CR][LF]” used to program key L1 to transmit “L1D” on Press Down. (Custom message)

0x01 0x02 0x03

Message “\$DSPKD,L1,010203\*32[CR][LF]” used to program key L1 to transmit the three bytes 0x01, 0x02, and 0x03 on Press Down. (Custom message)

Response: N/A

**Warning: A factory reset will revert the key down message to factory default (see “Factory Default Key Down and Key Up Transmit Text” section).**

### DSKUP “Key Up” Command

---

The DSKUP Key Up command transmits a message after a key has been released from Key (press) Down. The message transmitted can be programmed using DSPKU (Program Key Up) command. Each key can transmit up to 20 bytes. If a custom message has not been programmed, a factory default message for the key will transmit.

| FIELD | NAME  | DATA                                                                           |
|-------|-------|--------------------------------------------------------------------------------|
| 0     | BTNID | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5 |

Example: \$DSKUP,L1\*08[CR][LF]

**Factory default** transmit message for top left key (L1) when released (from Press Down).

Response: N/A

**Warning: A factory reset will revert the key down message to factory default (see “Factory Default Key Down and Key Up Transmit Text” section).**

# COMMUNICATION PROTOCOL (CONTINUED)

## DSCDV “Change Displayed Video” Command

The DSCDV Change Displayed Video command is used to change the input video source.

| FIELD | NAME   | DATA           |
|-------|--------|----------------|
| 0     | Source | C1, C2, C3, C4 |

Example: \$DSCDV,C1\*18[CR][LF]

Video changed to Composite 1 input.

Response: DSACK or DSNACK

## DSIBT “Initiate IBIT” Command

The DSIBT Initiate IBIT command starts the IBIT System Test. Immediately upon receiving DSIBT, the PSM responds with DSBTR (Request IBIT Results), indicating the IBIT test set is incomplete. When IBIT completes, the DSBTR is transmitted with IBIT results. The DVR is unable to process any commands until the IBIT test has completed.

| FIELD | NAME        | DATA |
|-------|-------------|------|
| 0     | Placeholder | 00   |

Example: \$DSIBT,00\*64[CR][LF] (Command runs.)

Response: DSBTR: transmitted after IBIT test with IBIT not completed, then again after IBIT completes, with test set results. DSNACK: command not recognized or contained errors.

## DSBTQ “Request IBIT Results” Command

The DSBTQ Request IBIT Results command requests the DVR to transmit the last IBIT System Test results. Use DSIBT (Initiate IBIT) command if a test needs to be run.

| FIELD | NAME        | DATA |
|-------|-------------|------|
| 0     | Placeholder | 00   |

Example: \$DSBTQ,00\*7C[CR][LF]

Requests an IBIT response from PSM

Response: DSBTR or DSNACK

## DSBTR “IBIT Response” Command

The DSBTR IBIT Response command contains status information and results from running IBIT System Test. When DSIBT (initiate IBIT) is received, the DVR immediately transmits an IBIT response with status flags bit 7 set low. Upon completion, the DVR transmits a second response message with status flags bit 7 set high, with test results.

# COMMUNICATION PROTOCOL (CONTINUED)

| FIELD | NAME             | DATA                                                                                                                                                                                                                                                                                                                                                                                  |
|-------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | BIT Status Flags | bit 7: 1 IBIT complete / 0 IBIT incomplete<br>bit 6: 1 IBIT success / 0 IBIT fail<br>bit 5: reserved<br>bit 4: reserved<br>bit 3: reserved<br>bit 2: reserved<br>bit 1: reserved<br>bit 0: reserved                                                                                                                                                                                   |
| 1     | BIT Status Flags | Byte order follows big endian format<br>1 = pass / 0 = fail<br><br>bit 15: reserved<br>bit 14: reserved<br>bit 13: reserved<br>bit 12: reserved<br>bit 11: reserved<br>bit 10: reserved<br>bit 9: reserved<br>bit 8: reserved<br>bit 7: reserved<br>bit 6: reserved<br>bit 5: reserved<br>bit 4: reserved<br>bit 3: reserved<br>bit 2: reserved<br>bit 1: reserved<br>bit 0: reserved |

Example: \$DSBTR,00,0000\*53[CR][LF]

IBIT incomplete response message

Example: \$DSBTR,80,0000\*5B[CR][LF]

IBIT complete and failed response message

Example: \$DSBTR,C0,0000\*20[CR][LF]

IBIT complete and successful response message

Response: N/A

## DSFWQ "Request Firmware Version" Command

The DSFWQ Request Firmware Version command requests DSFWR (Firmware Version Response) from the DVR.

| FIELD | NAME        | DATA |
|-------|-------------|------|
| 0     | Placeholder | 00   |

# COMMUNICATION PROTOCOL (CONTINUED)

Example: \$DSFWQ,00\*7B[CR][LF] (*Command runs.*)

Response: DSFWR or DSNACK

## DSFWR “Request Firmware Response” Command

The DSFWR Request Firmware Response command answers the DSFWA (Request Firmware Version) command. The data contains the year, month, and day of month the firmware was compiled.

| FIELD | NAME         | DATA  |
|-------|--------------|-------|
| 0     | Year 20xx    | 00-99 |
| 1     | Month        | 01-12 |
| 2     | Day of Month | 01-31 |

Example: \$DSFWR,13,07,08\*75[CR][LF]  
*DVR reported Firmware version is July 08 2013*

Response: N/A

## DSPKM “Program Key Mode” Command

The DSPKM command can be used to set the DSPKD, DSPKU, DSPKF and DSPKT operating mode. This is useful for disabling drawing until all keys are programmed and for disabling saving key setting to non-volatile storage.

| FIELD | NAME | DATA                                                                                                                                                                          |
|-------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | Mode | 00 – Resume Normal Operation (Enable Drawing and Save Values). OSD is redrawn if mode was suspending drawing.<br>01 – Suspend Drawing<br>02 – Suspend Drawing and do not save |

Example: \$DSPKM,01\*6C[CR][LF]      //Suspend drawing  
          ... program key info  
          \$DSPKM,00\*6D[CR][LF]      //Resume drawing and force scene to repaint

Response: DSACK or DSNACK

## DSPKD “Program Key Down Transmit Message” Command

The DSPKD Program Key Down Transmit Message command is used to program the message a key will transmit when pressed. The data in Field 1 is encoded in a series of ASCII character pairs representing hex bytes. For example, the ASCII characters “0102” represent the two hex bytes 0x01 and 0x02; these two hex bytes transmit when the key is pressed.

# COMMUNICATION PROTOCOL (CONTINUED)

| FIELD | NAME             | DATA                                                                                                                                                   |
|-------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | BTNID            | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5                                                                         |
| 1     | Key Down Message | Hex bytes encoded as an ASCII Hex Character Sequence. Maximum data length is 40 bytes, which will represent up to the 20 hex bytes a key can transmit. |

Example: \$DSPKD,L1,4C31440D0C\*47[CR][LF]

*Top left key (L1) set to transmit "L1D\r\n" when pressed. '\r' and '\n' are escape sequences for carriage return and newline characters.*

Response: DSACK or DSNACK

## DSPKU "Program Key Up Transmit Message" Command

The DSPKU Program Key Up Transmit Message command is used to program the message a key will transmit when released (from Press). The data in Field 1 is encoded in a series of ASCII character pairs representing hex bytes. For example, the ASCII characters "0102" represent the two hex bytes 0x01 and 0x02; these two hex bytes transmit when the key is released.

| FIELD | NAME           | DATA                                                                                                                                                   |
|-------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | BTNID          | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5                                                                         |
| 1     | Key Up Message | Hex bytes encoded as an ASCII Hex Character Sequence. Maximum data length is 40 bytes, which will represent up to the 20 hex bytes a key can transmit. |

Example: \$DSPKU,L1,4C31550D0C\*56[CR][LF]

*Top left key (L1) set to transmit "L1U\r\n" when pressed. '\r' and '\n' are escape sequences for carriage return and newline characters.*

**Note: Maximum key up transmit text is 20 bytes.**

Response: DSACK or DSNACK

## DSPKF "Program Key Function" Command

| FIELD | NAME     | DATA                                                                           |
|-------|----------|--------------------------------------------------------------------------------|
| 0     | BTNID    | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5 |
| 1     | Function | NONE, COMM, SWAP, VIEW1, VIEW2, VIEW3, VIEW4, C1, C2, C3, C4                   |

Example: \$DSPKF, L1, COMM\*3B

*Top left key (L1) set to cycle the video input*

Response: DSACK or DSNACK

# COMMUNICATION PROTOCOL (CONTINUED)

## DSPKT "Program OSD Key Text" Command

| FIELD | NAME          | DATA                                                                                                                                         |
|-------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | BTNID         | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5                                                               |
| 1     | Hex ACII Text | Hex bytes encoded as an ASCII Hex character Sequence. The hex string must be less than or equal to 12 bytes representing up to 6 characters. |

Example: \$DSPFT, L1, 535243\*2E

*Top left key (L1) set to display the text "SRC"*

Response: DSACK or DSNACK

## DSKDQ "Request Key Down Transmit Message" Command

| FIELD | NAME  | DATA                                                                           |
|-------|-------|--------------------------------------------------------------------------------|
| 0     | BTNID | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5 |

Example: \$DSKUQ,L1\*09[CR][LF]

Response: DSKDR or DSNACK

## DSKUQ "Request Program Key Up Transmit Message" Command

| FIELD | NAME  | DATA                                                                           |
|-------|-------|--------------------------------------------------------------------------------|
| 0     | BTNID | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5 |

Example: \$DSKDQ,L1\*18[CR][LF]

Response: DSKUR or DSNACK

## DSKFQ "Request Program Key Function Transmit Message" Command

| FIELD | NAME  | DATA                                                                           |
|-------|-------|--------------------------------------------------------------------------------|
| 0     | BTNID | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5 |

Example: \$DSKFQ,L1\*1A[CR][LF]

Response: DSKFR or DSNACK

## DSKTQ "Request Program Key Text Transmit Message" Command

| FIELD | NAME  | DATA                                                                           |
|-------|-------|--------------------------------------------------------------------------------|
| 0     | BTNID | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5 |

# COMMUNICATION PROTOCOL (CONTINUED)

Example: \$DSKTQ,L1\*08[CR][LF]

Response: DSKTR or DSNACK

## DSKDR “Key Down Transmit Message Response” Command

The DSKDR is a response message to a DSKDQ and contains the transmit message used when the key is pressed.

| FIELD | NAME  | DATA                                                                           |
|-------|-------|--------------------------------------------------------------------------------|
| 0     | BTNID | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5 |

Example: \$DSKDR,L1,4C31440D0C\*45[CR][LF]

*Top left key (L1) set to transmit “L1D\r\n” when pressed. ‘\r’ and ‘\n’ are escape sequences for carriage return and newline characters.*

Response: DSACK or DSNACK

## DSKUR “Key Up Transmit Message Response” Command

The DSKUR is a response message to a DSKDQ and contains the transmit message used when the key is released (from being pressed).

| FIELD | NAME           | DATA                                                                                                                                               |
|-------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | BTNID          | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5                                                                     |
| 1     | Key Up Message | Hex bytes encoded as an ASCII Hex character Sequence. Maximum data length is 40 bytes, which will represent up to 20 hex bytes a key can transmit. |

Example: \$DSKUR,L1,4C31550D0C\*54[CR][LF]

*Top left key (L1) set to transmit “L1U\r\n” when pressed. ‘\r’ and ‘\n’ are escape sequences for carriage return and newline characters.*

**Note: Maximum key up transmit text is 20 bytes.**

Response: DSACK or DSNACK

## DSKFR “Key Function Response” Command

The DSKFR is a response message to the DSKFQ command. The response message contains the function assigned to the key.

| FIELD | NAME     | DATA                                                                           |
|-------|----------|--------------------------------------------------------------------------------|
| 0     | BTNID    | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5 |
| 1     | Function | NONE, COMM, SWAP, VIEW1, VIEW2, VIEW3, VIEW4, C1, C2, C3, C4                   |

# COMMUNICATION PROTOCOL (CONTINUED)

Example: \$DSKFR, L1, COMM\*39 [CR][LF]  
*Top left key (L1) is set to cycle the video input*

Response: DSACK or DSNACK

## DSKTR "OSD Key Text Response" Command

The DSKTR is the response message to a DSKTQ command. The message contains the OSD text assigned to the key.

| FIELD | NAME          | DATA                                                                                                                                         |
|-------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | BTNID         | L1, L2, L3, L4, L5, R1, R2, R3, R4, R5, B1, B2, B3, B4, B5, T1, T2, T3, T4, T5                                                               |
| 1     | Hex ACII Text | Hex bytes encoded as an ASCII Hex character Sequence. The hex string must be less than or equal to 12 bytes representing up to 6 characters. |

Example: \$DSKTR, L1, 535243\*21[CR][LF]  
*Top left key (L1) text is "SRC"*

Response: DSACK or DSNACK

## DSACK "Acknowledge Response" Command

The DSACK Acknowledge Response command is DVR's response to valid commands.

| FIELD | NAME        | DATA |
|-------|-------------|------|
| 0     | Placeholder | 00   |

Example: \$DSACK,00\*72[CR][LF] (Command runs.)

Response: N/A

## DSNAK "Not Acknowledge Response" Command

The DSNACK Not Acknowledge Response command is the DVR's response when it receives a command it does not recognize or the received command has errors such as the checksum failed.

| FIELD | NAME        | DATA |
|-------|-------------|------|
| 0     | Placeholder | 00   |

Example: \$DSNAK,00\*7F[CR][LF] (Command runs.)

Response: N/A

# COMMUNICATION PROTOCOL (CONTINUED)

## Factory Default Key Down and Key Up Transmit Text

These Factory Default Key Down and Key Up softkeys (below) are factory-programmed to transmit the following text messages.

**Note: They will be reset to these values if a Factory Reset is performed from the Main Menu > Utility Menu > Factory Reset (Figure 23).**

| BTN       | Event | Text                  | BTN       | Event | Text                  |
|-----------|-------|-----------------------|-----------|-------|-----------------------|
| <b>L1</b> | Down  | \$DSKDN,L1*07[CR][LF] | <b>R1</b> | Down  | \$DSKDN,R1*19[CR][LF] |
|           | Up    | \$DSKUP,L1*08[CR][LF] |           | Up    | \$DSKUP,R1*16[CR][LF] |
| <b>L2</b> | Down  | \$DSKDN,L2*04[CR][LF] | <b>R2</b> | Down  | \$DSKDN,R2*1A[CR][LF] |
|           | Up    | \$DSKUP,L2*0B[CR][LF] |           | Up    | \$DSKUP,R2*15[CR][LF] |
| <b>L3</b> | Down  | \$DSKDN,L3*05[CR][LF] | <b>R3</b> | Down  | \$DSKDN,R3*1B[CR][LF] |
|           | Up    | \$DSKUP,L3*0A[CR][LF] |           | Up    | \$DSKUP,R3*14[CR][LF] |
| <b>L4</b> | Down  | \$DSKDN,L4*02[CR][LF] | <b>R4</b> | Down  | \$DSKDN,R4*1C[CR][LF] |
|           | Up    | \$DSKUP,L4*0D[CR][LF] |           | Up    | \$DSKUP,R4*13[CR][LF] |
| <b>L5</b> | Down  | \$DSKDN,L5*03[CR][LF] | <b>R5</b> | Down  | \$DSKDN,R5*1D[CR][LF] |
|           | Up    | \$DSKUP,L5*0C[CR][LF] |           | Up    | \$DSKUP,R5*12[CR][LF] |
| <b>B1</b> | Down  | \$DSKDN,B1*09[CR][LF] | <b>T1</b> | Down  | \$DSKDN,T1*1F[CR][LF] |
|           | Up    | \$DSKUP,B1*06[CR][LF] |           | Up    | \$DSKUP,T1*10[CR][LF] |
| <b>B2</b> | Down  | \$DSKDN,B2*0A[CR][LF] | <b>T2</b> | Down  | \$DSKDN,T2*1C[CR][LF] |
|           | Up    | \$DSKUP,B2*05[CR][LF] |           | Up    | \$DSKUP,T2*13[CR][LF] |
| <b>B3</b> | Down  | \$DSKDN,B3*0B[CR][LF] | <b>T3</b> | Down  | \$DSKDN,T3*1D[CR][LF] |
|           | Up    | \$DSKUP,B3*04[CR][LF] |           | Up    | \$DSKUP,T3*12[CR][LF] |
| <b>B4</b> | Down  | \$DSKDN,B4*0C[CR][LF] | <b>T4</b> | Down  | \$DSKDN,T4*1A[CR][LF] |
|           | Up    | \$DSKUP,B4*03[CR][LF] |           | Up    | \$DSKUP,T4*15[CR][LF] |
| <b>B5</b> | Down  | \$DSKDN,B5*0D[CR][LF] | <b>T5</b> | Down  | \$DSKDN,T5*1B[CR][LF] |
|           | Up    | \$DSKUP,B5*02[CR][LF] |           | Up    | \$DSKUP,T5*14[CR][LF] |

*This section is intentionally left blank.*

# INTERNAL HEATER

## Internal Heater

The Internal Heater automatically brings the Display up to standard operating temperature if the Display is below that temperature when powered on.

## Operations

- The flashing amber orange LED light behind the Power Key indicates the Display is in heating mode, which is bringing the Display up to internal operational temperature
- Once Display is up to operational temperature, the flashing LED becomes a constant blue illumination and the Display automatically powers on
- Maximum time for Display to reach operational temperature is approximately 12 minutes (15 minutes for 15" display), and
- There are no user adjustments for the Internal Heater function.

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# APPENDIX A

## Mechanical Drawings

Mount diagrams and dimensions may assist with installation. Overview drawings can be found on the corresponding product download page. These may be found on the MarinePC website: <http://www.marinepc.com/>

### Optional Mounts

Diagrams of Flush, Panel or Rack Mounts and dimensions may assist with installation of Display. These may also be found at the MarinePC website, or consult Factory at [info@marinepc.com](mailto:info@marinepc.com).

# APPENDIX B

## NEMA AND IP INDUSTRY STANDARDS

Two major electrical manufacturing organizations Displaying product enclosures and/ or their degree of protection; each organization publishes technical manufacturing standards. The National Electrical Manufacturers Association (NEMA) Standard No. 250 – 2003 addresses non-hazardous locations, enclosure design and environmental performance requirements. These are referred to as NEMA Types. ([www.nema.org](http://www.nema.org))

The International Electrotechnical Commission (IEC) 60529 Standard addresses Ingress Protection (IP); this describes the degree of enclosure protection provided, not the enclosure itself. The first digit of IP Code designation describes degree of protection against ingress of solids; second digit designates degree of protection against ingress of liquids. IP Codes support NEMA Type designations. ([www.iec.ch](http://www.iec.ch))

MarinePC designs and builds the MPC-ML--DVR sealed Display to exceed Standards of NEMA 6 and IP67, incorporating a range of environmentally-sealed connectors engineered to provide a safe and secure dust and waterproof environment in rugged conditions.

Summary of NEMA 6/IP 67: Enclosures constructed for indoor or outdoor use; to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt; against hose-directed water and the entry of water during occasional temporary submersion at a limited depth (6" to 3 feet or 15cm to 1m); and that will be undamaged by external formation of ice on the enclosure. Sealed from dust and water.

# NOTES





## Warranty Terms and Conditions

**MarinePC** offers its products and services for sale under the following terms and conditions. Any and all orders will be accepted only at the sole discretion of **MarinePC** and under these terms and conditions. Any modification to these terms and conditions can only be made by **MarinePC** in writing. Agreement to any modifications must be made by all participants of the sale prior to the acceptance of any order.

**Prices:** All published prices are in effect from the date noted on the price sheet. Prices are subject to change without notice. Written quotations may be requested. Written quotations are valid for 30 days. All prices are quoted in U.S. dollars. Any and all taxes, tariffs, currency translations, duties, insurance, freight charges and any other handling charges are the responsibility of the purchaser, and must be prepaid and/or charged.

**Acceptance:** All orders will be accepted at the sole discretion of **MarinePC**. Any order can be rejected for any reason at any time without liability.

**Payment:** All purchasers must prepay the order, accept COD shipment or arrange for other acceptable methods of guaranteed payment (credit card, bank letter of credit, etc.) before any order will be shipped. VISA, MasterCard, DiscoverCard and American Express are welcomed and encouraged.

**Shipments:** All shipments are FOB Scottsdale, Arizona. Purchaser is encouraged to provide **MarinePC** with shipping authorization on their freight account. Unless otherwise specified, **MarinePC** will select the best way for shipment, using common carrier, FedEx Ground or UPS Ground. Shipments that are not billed to consignee or third party will incur a 20% handling charge and be added to the invoice. Delivery is not guaranteed. All risk of loss is assumed by the purchaser upon delivery by **MarinePC** to the carrier. Special terms may apply for international shipments. Unless otherwise specified by the purchaser and accepted by **MarinePC** at the time of purchase, **MarinePC** reserves the right to partial ship any order.

**Cancellations:** Once an order is placed by the purchaser and accepted by **MarinePC**,

cancellation charges will apply to any and all unshipped items. Partial credit may be extended if products are returned unused in original packaging within 30 days of shipment. No credit will be issued on any returns or cancellations after 30 days from date of shipment.

**Returns:** Once a product has been shipped, no returns will be accepted unless an RMA number has been issued by **MarinePC** prior to its return. The RMA number must be prominently displayed on the outside of the returned packing materials. **MarinePC** cannot be responsible for damage from shipping. All authorized returns must be shipped prepaid directly back to **MarinePC** in the original packaging. Returnee is responsible for all shipping and handling costs to and from the closest **MarinePC** authorized repair location. For authorized in-warranty service only, **MarinePC** will pay for the return of the unit via normal domestic ground service. Expedited return service or shipment outside of U.S. must be prepaid by receiving party.

**Standard Limited Warranty:** **MarinePC** warrants its products to be free from defects in materials for a period of Two (2) Years from the date of the original shipment from the factory. **MarinePC** agrees to repair the product without labor cost to the purchaser, for a period of One (1) Year from the original ship date. No other warranty is expressed or implied. Specifically excluded is normal wear and tear, abuse or misuse of the products. **MarinePC** does not make any claims or warrant the products with respect to the purchaser's use or application of the products. Products returned but found not to be within the terms of this warranty are subject to a service fee to be paid prior to the return of the product to the purchaser.

**Liability:** Any claim which may be made against **MarinePC** with regard to this contract for sale must occur within One (1) year from date of original shipment from the factory. IN NO EVENT SHALL **MarinePC** BE LIABLE FOR LOSS OF PROFITS, LOSS OF USE, LEGAL OR PROFESSIONAL FEES, CONSEQUENTIAL OR INCIDENTAL DAMAGE OR FOR SPECIFIC PERFORMANCE OF THE PRODUCTS, THEIR MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.